BARBADOS

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23 MAR 1929

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR

1927-28

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REPORT

OF THE

DEPARTMENT OF AGRICULTURE,

BARBADOS

1927—1928.

LETTERS OF TRANSMITTAL.

Department of Agriculture,
Barbados
June 29, 1928.

Sir,

In accordance with Section 10 (xiv) of the Department of Science and Agriculture Act (1925-32), I have the honour to submit to the Board of Agriculture a Report on the work of the Department during the financial year 1927-28.

2. Subsection (xvi) of Section 10 of the said Act requires that during the month of October a Report be made to the Board of Agriculture on the results of the Sugar-cane Experiments of the year ending the 30th of June previous.

3. Inasmuch as the Sugar-cane Experiments for the past year are already complete, I recommend that the results of such Experiments, which have been included in the Report referred to in paragraph one, be received at once.

I have the honour to be,
Sir,
Your most obedient servant,

C. C. SKEETE,
Acting Director of Agriculture.

Lt.-Col. The Honourable
Sir F. J. Clarke, K.C.M.G., B.A., M.C.P.,
Chairman of the Board of Agriculture.

Board of Agriculture,
Department of Agriculture,
Barbados,
July 13, 1928.

Sir,

I have the honour, by direction of the Board of Agriculture, to transmit the Report on the Department of Agriculture for the financial year 1927-28.

2. I trust that it may be possible to print and publish this Report at an early date.

I have the honour to be,
Sir,
Your most obedient servant,

F. J. CLARKE,
Chairman of the Board of Agriculture.

The Honourable
The Colonial Secretary,
Public Buildings.

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STAFF

Director of Science and Agriculture	J. P. d'Albuquerque, M.A., (Cantab) F.I.C., F.C.S., (London). Resigned on 18th February 1928.
Assistant Director	C. C. Skeete, B.A. (Cantab)
Assistant Geneticist	A. E. S. McIntosh, B.Sc., Ph. D., (Edin).
Assistant Agricultural Chemist	S. J. Saint, B.Sc., (London) A.I.C.
Assistant to Professor of Chemistry	R. R. Hall, B.A. (Cantab)
Lecturer in Natural & Agricultural Sciences ..	J. H. Robinson, B.A. (Cantab)
Chief Analytical Assistant	C. A. Coppin, B.A. Sc., (Toronto)
Plant Diseases Inspector	D. R. D. Wiles, D.I.C.T.A.
Chief Clerk	H. O. Ramsey.
Second Clerk	G. D. Ramsey.
Third Clerk	C. G. Humphrey.
Fourth Clerk	Miss V. H. Roach.
First Field Assistant	C. O. Haynes.
Second Field Assistant	C. B. Foster.
Third Field Assistant	S. H. Evelyn, D.I.C.T.A.
Fourth Field Assistant	J. N. W. Niccolls.
Analytical Assistant	H. A. Jones.
„ „	C. St. A. Alleyne.
„ „	L. A. Hall.
Botanical Assistant	C. C. Corbin.
Foreman in charge of Nurseries	S. A. Eastmond.

ESTABLISHMENT.

The members of the Board of Agriculture, appointed for the Legislative Session 1927-28, were as follows:—

Lt. Col. The Honourable Sir F. J. Clarke, B.A., K.C.M.G., M.C.P., Chairman.
The Honourable G. L. Pile, B.A., M.L.C.
The Honourable A. P. Haynes, M.L.C.
The Honourable E. A. Hinkson, M.B.E., M.L.C.
W. B. H. Massiah, Esq., M.A., M.D., C.M., M.C.P.
S. C. Thorne, Esq., M.C.P.
G. C. Mahon, Esq., M.C.P.
G. D. L. Pile, Esq., B.A., M.C.P.

The Director of Agriculture is an *ex officio* member of the Board.

Hon. D. G. Leacock, M.L.C., acted as a member of the Board from September to November during the absence from the Colony of the Hon. G. L. Pile.

J. D. Chandler, Esq., M.C.P., acted as a member of the Board from June to September during the absence from the Colony of the Hon. E. A. Hinkson.

The Board held fourteen meetings during the year.

The Director of Agriculture was unfortunately forced to obtain seventeen days sick leave during July. Vacation leave was granted to the Director from the 27th of July until the 6th of September, and duty leave to attend the Imperial Agricultural Research Conference from the 7th of September until the 25th of November. The Director sailed for England on the 10th of August to attend the Conference in London. After the Conference he was granted an extension of vacation leave from the 26th of November until the 8th of February, when he returned to the Colony.

During the absence of the Director, the Assistant Director acted as Director of Agriculture and the Assistant to the Professor of Chemistry acted in charge of the Government Laboratory.

The Director resigned on the 18th of February, 1928.

Professor d'Albuquerque, as Island Professor of Chemistry from 1890 to 1925, and subsequently as Director of Science and Agriculture, was connected with the agriculture of the Island for 38 years. The establishment of the new Department of Science and Agriculture in 1925, the collection of its Scientific Officers and the organization of the Department were the result of his great ability and experience. It had been hoped that he would remain for a few more years to direct the operations of the Department.

Consequent on the resignation of the Director, the Assistant Director was appointed to act as Director and the Assistant Agricultural Chemist to act as Assistant to the Professor of Chemistry.

R. Radclyffe Hall, Esq., B.A., Assistant to the Professor of Chemistry, retired on the 31st of March 1928, after 37 years service in the Colony.

L. C. C. Liebenberg, Esq., B.Sc.A., M.S.A., Assistant Geneticist resigned on the 25th of June, 1927.

A. E. S. McIntosh, Esq., B.Sc., Ph.D., (Edin) was appointed Assistant Geneticist on the 6th of December 1927. Dr. McIntosh proceeded to Rothamsted to undergo a short course in the microbiology of soils and arrived in the Colony on the 27th of January, 1928.

VISITORS TO THE DEPARTMENT.

On the 27th of April, 1927, His Excellency the Acting Governor, the Honourable D. R. Stewart, visited and inspected the laboratories and experimental stations of the Department.

Mr. Harold E. Box, who was then proceeding to Argentine as Chief of the Division of Entomology of the Tucuman Agricultural Experiment Station, visited the Department on the 20th of April, 1927. Mention is made of his visit elsewhere in this Report.

The Principal of the Imperial College of Tropical Agriculture and the Commissioner of Agriculture for the West Indies also visited the Department in April, 1927.

Mr. H. C. Sampson, C.I.E., Economic Botanist of the Royal Botanic Gardens, Kew, paid two short visits to the Colony in June and July, 1927. Mr. Sampson made a rapid tour of inspection of the experimental work of the Department and at the same time noted the general agricultural conditions of the island.

EXPENDITURE.

Personal Emoluments	£ 6,001 8 3
Overtime Allowance	23 10 0
Travelling Allowances	713 5 5
Appointment expenses of Scientific Officer	48 2 4
Expenses of Delegate to Imperial Agricultural Research Conference	168 4 0
Expenses in eradicating Mosaic Disease	1,137 10 7
Experiment Stations and Botanic Station	2,714 3 6
Mill House, Ginnery and Laboratories	1,144 2 5
Sampling of Food Stuffs and Fertilizers	11 8 8
Total	£ 11,961 15 2

RECEIPTS.

Sale of Ornamental Plants	£ 33 14 7
Sale of Produce from land leased by the Department	251 14 7
Total	£285 9 2

PLANT INTRODUCTION, DISTRIBUTION AND IDENTIFICATION.

The importation of seeds of various ornamental flowering trees and shrubs was continued during the year. The Department is grateful to those Departments of Agriculture and Botanic Gardens that collected and forwarded seeds.

Several dozen young citrus trees were imported from Florida for local distribution.

The receipts for the sale of plants in pots and cuttings for the year 1927-28 amounted to £33 14. 7.

The distribution of plants during the year, other than those distributed under the Arbor Day distribution, was as follows:—

(1)	Ornamental flowering trees	27
(2)	Ornamental foliage trees	289
(3)	Ornamental plants	
	(a) Palms	259
	(b) Bougainvillaea	250
	(c) Miscellaneous	242
(4)	Cordia interrupta	10,029
(5)	Fruit trees	102

During the course of the year the Department identified a number of local plants for enquirers.

The Department is indebted to the Royal Botanic Gardens, Kew, for the identification of a number of locally grown plants.

The Department was called upon to give assistance to the Public Works Department in the eradication of an undesirable grass which recently made its appearance on the Garrison Savannah. The Director of the Royal Botanic Gardens, Kew, identified the grass as *Themeda arguens*, Hack., and stated that it was known in some countries as "Christmas grass" but that he had no record of its becoming a pest or seriously displacing other grasses. This grass, however, is distinctly undesirable on local pastures, in as much as animals refuse to graze it, and by its vigorous growth and hardy nature it would soon replace the more useful grasses.

"Christmas grass" is very easily distinguished during its flowering stage which takes place in December and January, and advantage of this opportunity should be taken for digging it out, and burning it before the seeds are formed.

Another grass, which became objectionable on the Garrison Savannah on account of its tall inflorescences which appear in October, was identified by the Director of the Royal Botanic Gardens, Kew, as *Andropogon caricosus*, L. It is

not disliked by grazing animals, and it is unlikely to replace the local "Sour grass", *Andropogon intermedius var. acidus.*

There was observed for the first time another species of *Cuscuta,* to which genus the parasitic plant locally known as "Love Vine" belongs. It was identified by the Director of the Royal Botanic Gardens, Kew, as *Cuscuta gracillima,* Engelm. He reports that it was previously recorded from Mexico only. It has so far only been observed on plants of no economic importance.

In 1925, small specimens of the following trees *Hydnocarpus Wightiana, Taraktogenos Kurzii,* and *Oncoba echinata* were imported into the Island and planted at selected places on the hills. From these trees chaulmoogra oil, used in the treatment of leprosy, is obtained. I regret to report that the local climatic and possibly soil conditions have proved unfavourable to these trees and that they have died.

ARBOR DAY.

The Department issued the customary invitation to the public to make application for the growth and free distribution of conspicuous flowering and ornamental [illegible] trees. The following trees were distributed during the months of July and August:—

Botanical Name.	Local or Common Name.	Number.
Achras sapota	Sapodilla	1
Anona squamosa	Sugar Apple	1
Bauhinia sp.		1
Bontia daphnoides	Barbados Olive	52
Bougainvillaea sp.		280
Caesalpinia sepiaria		1
Capparis Breynia	Black Willow	24
Carica Papaya	Papaw	1
Cassia sp.		[illegible]
Casuarina equisetifolia, L.	Casuarina or Mile Tree	2,379
Chlorophora tinctoria, Gaud.	Fustic	24
Cordia sp.		25
Cordia interrupta		1
Dillenia indica		1
Erythrina Umbrosa		1
Galphimia glauca	Canaris	20
Guaiacum officinale, L.	Lignum vitae	3
Jacaranda ovalifolia		5
Kleinhovia Hospita		1
Lagerstroemia Flos-reginae, Retz.	Queen of Flowers	2
Lagerstroemia indica		33
Lysiloma sabicu, Benth.	Horseflesh mahogany	9
Mammea americana, L.	Mammee Apple	1
Melicocca bijuga, L.	Ginep	2
[illegible], Wight & Arn.-Prod.	[illegible] tree	1
Platymiscium platystachyum	Robie tree	1
Peltophorum Vogelianum, Walp.-Rep.	Pride of India	6
Peltophorum linnaei	Brazilletto wood	2
Pithecolobium unguis-cati	Bread and Cheese	20
Poinciana regia, Boj.	Flamboyante	4
Psidium Guajava.	Guava	1
Solanum macranthum	Potato tree	1
Spathodea campanulata, Beauv.		1
Swietenia [illegible], King.	British Honduras Mahogany	41
Swietenia mahagoni, L.	Mahogany	61
Tamarindus indica, L.	Tamarind	13
Tecoma serratifolia, G. Don.	Yellow Poui	2
Tecoma pentaphylla		3
Miscellaneous		13
	Total	3,114

NOTES ON THE SUGAR CANE INDUSTRY.

Assuming that tillage and manuring operations of an average standard have been performed, the most important factor determining the growth of the sugar cane crop in Barbados is rainfall. The rainfall for the period of growth of the sugar cane crop referred to in this Report and its effect on that crop is briefly summarized in the following remarks.

After a series of more or less unfavourable seasons, the season of growth of the 1926-28 sugar cane crop was distinctly favourable. Beginning with wet conditions in November and December 1926, which provided favourable conditions for germination, the young crop never suffered for want of moisture, an unusual amount of rain falling in March, April and June. Consequently, by the end of June, 1927, the young crop had reached a very advanced stage. In certain districts, however, the rainfall was considerably below the average for the period from the beginning of July to the middle of September. In the low land parts of the parishes of St. Peter and St. James, a smaller quantity of rain was recorded for the corresponding period in only one year, 1912, within the last forty years. The result of this dry spell was that in certain districts the advanced canes suffered and received a serious setback. From the middle of September, 1927, to the end of January, 1928, the rainfall conditions were very favourable, there being heavy rains in October and November especially. A dry spell began at the beginning of February, 1928, and continued normally for two months, becoming a severe drought by April and May, and not being broken by the middle of June.

In general the sugar crop of 1926-28 has slightly exceeded that of 1925-27. There was an abnormal amount of arrowing (flowering) of the canes in November, 1927, particularly in many districts where arrows are rare. This was probably due to the advanced state of growth the canes had reached. The advanced growth at an early stage, along with the drying of the canes following upon arrowing, contributed largely to the high percentage of rotten canes met with, especially in the variety Ba. 11569, in increasing rates as the season progressed. In contrast to the increasing yield per acre of the canes during the reaping season of 1927 as that season advanced, due to the abnormal rainfall in March and April in that year, the yield per acre diminished in 1928 as the reaping season advanced, the greatest losses from "rotting" and "drying" of canes being experienced with the variety Ba. 11569.

According to the Customs returns for the year 1927, 50,220 17/20 tons of vacuum pan crystals, 2,885 4/20 tons of muscovado sugar and 8,258,690 wine gallons of molasses, equal at 110 gallons per puncheon, to 75,079 puncheons of molasses of all grades, were exported of the total value of £1,242,335 made up as follows:—

Sugar	Tons	Value	
Dark Crystals	50,220 17/20	£765,868	
Muscovado	2,885 4/20	49,769	£815,637
	53,106 1/2		
Molasses	Gallons	Value	
Fancy	7,294,202	410,299	
Choice	501,640	12,541	
Vacuum Pan	462,848	3,858	£426,698
	8,258,690		£1,242,335

TABLE SHOWING EXPORTS OF SUGAR AND MOLASSES FOR THE FIVE YEARS 1922-26 COMPARED WITH EXPORTS OF SUGAR AND MOLASSES FOR THE YEAR 1927.

Sugar.	1922	1923	1924	1925	1926	Average 1922-26	1927
Dark Crystal	29,863	43,497	35,640	43,561	42,990	39,110	50,221
Yellow Crystal	12	—	31	10	—	10	—
White Crystal	1	1	1	—	—	1	—
Muscovado	3,946	5,562	5,668	3,889	2,795	4,372	2,885
Actual Sugar Crop, tons	33,822	49,060	41,340	47,460	45,785	43,493	53,106
Molasses.							
Fancy	6,555,749	5,187,339	4,998,298	6,880,789	7,085,523	6,141,540	7,294,202
Choice	823,521	1,121,669	818,365	761,822	431,608	791,397	501,640
Vacuum Pan	11,139	50,150	170,790	208,355	243,203	136,727	462,848
Barbados	—	—	—	7,188	—	1,437	—
Special	—	—	—	11,121	—	2,224	—
Total Molasses crop, gallons.	7,390,409	6,359,158	5,987,453	7,869,275	7,760,334	7,073,326	8,258,690

NOTES ON THE COTTON INDUSTRY.

The great damage caused by the pink boll worm in the crop of 1926-27, coupled with the very poor market or almost entire absence of a market for Sea Island Cotton, resulted in the planting of a comparatively small area of cotton for the season of 1927-28.

For the first time all seed for planting purposes was issued through the Department.

In general there was an exceptionally bad germination of the seed sown. There is no justification for the assumption that this was the result of the fumigation of the seed.

The poor germination was probably in many cases the result of bad planting. There is an increasing tendency to plant cotton seed too deep. The chopping of cotton holes with a hoe should be avoided wherever possible, because the seed is thereby often covered by four or six inches of soil, whereas a covering of one inch or less pressed down on the seed is desirable.

Seed taken from the same source which had been similarly fumigated, but carefully planted gave a germination of over 70 per cent in the fields at Codrington Experiment Station.

The acreage planted amounted to 371 acres, but a considerable portion was eventually abandoned. The approximate total crop was 34,916 lb of seed cotton.

LOCAL AGRICULTURAL EXHIBITION.

This year's Local Agricultural Exhibition for Peasant Proprietors and Children of the Elementary Schools which was held on December 7th at Warrens Factory, St. Michael, proved very successful. In fact, the opinion was expressed in certain quarters that the Show was one of the most successful held for many years.

Several factors combined to make the Show the success it was. In the first place, the weather held fair, there being only a few slight showers which did not cause any great inconvenience. Secondly, there was an exceptionally large attendance including some prominent planters, peasant proprietors, headteachers and children of the Elementary Schools, all of whom exhibited a keen interest in the Show. Thirdly, there was a considerable improvement not only in the number but in the quality of the various exhibits. The favourable situation of Warrens, together with the increase in the value and number of prizes apparently encouraged an unusually large number of competitors to compete at this year's Show. The Police Band was also present and contributed to the success of the function.

His Excellency the Governor Sir W. C. F. Robertson, K. C. M. G., accompanied by his A.D.C. Lieut. Bradburne, R.N., attended the Show and was kind enough to offer prizes again this year, this time in Class I—Young ox with four teeth—and in Class XII—Articles of Clothing for Boys.

Unlike last year, there was a noticeable improvement in the Live Stock section. Fine specimens of cattle, sheep, pigs and rabbits were to be seen while the donkeys were stated to be the best exhibited for several years. It may be mentioned that the Society for the Prevention of Cruelty to Animals again offered prizes for the best donkey cart turn-out. The exhibits of fowls were better than those of last year, some of the specimens being particularly good.

The fruit, vegetable and handiwork sections were displayed in the Factory building where, owing to improved arrangements having been made, visitors were enabled to inspect the many and varied exhibits with comfort. The fruits, especially the bananas, papaws, and golden apples, were greatly admired, and the vegetables with one or two exceptions reached a high standard of excellence.

The school children maintained their customary deep interest in the Show. The girls sent in splendid exhibits of clothing and their hat making was of a high order. The boys also gave a good account of themselves. Although there were no exhibits in the Brush Making Section and St. Christopher Boys' School was the only competitor in the making of Fishing Nets, there was keen competition in the growing of pot plants and the production of fruit and vegetables in the school gardens. Many schools did not compete in the collection of insects which attack economic crops grown in the Island but there was no

decrease in the number taking part in agricultural work which would bear very favourable comparison with similar work done on the best plantations.

Except in the agricultural section first prizes in which were won by Mr. D. Best, of St. Andrew Boys' School, Mr. E. G. Smithwick, of Mt. Hilloby, was again foremost among headteachers competing at the Show, while Miss I. Bradshaw, of St. Patricks Girls', easily led in the competitions open to girls.

In the afternoon the prizes were distributed by His Excellency the Governor. The Acting Director then addressed the gathering. His Excellency replied, and Rev. J. R. Nichols having thanked him for so doing, the function came to a close.

G.D.R.

INSPECTION AND FUMIGATION OF PLANTS, ETC.

The usual restrictions for the prevention of the introduction of foreign pests and diseases were enforced during the year. Five hundred and twenty-one consignments of plants, seeds, etc., were inspected and seventeen packages of growing plants and cuttings had to be destroyed.

FUMIGATION OF COTTON SEED.

Forty-one consignments of cotton seed amounting to 45,316 bags, imported for the extraction of oil, were fumigated with sulphur dioxide in the holds of the various vessels.

SUGAR CANE MOSAIC DISEASE.

Resulting from the considerable increase of mosaic disease in certain districts during the sugar cane crop of 1926 and the young cane crop of 1927, and from the inadequacy of the measures provided for dealing with the control of the disease, the Department was provided with the services of a Chief Plant Diseases Inspector and ten Sub-Inspectors of sugar cane mosaic disease.

The work of systematic inspection and the destruction of diseased canes was begun on the 1st of June 1927 after making a rapid survey of cane fields and small holdings, to ascertain the extent and distribution of the infection. The Sub-Inspectors were so distributed throughout the Island as to concentrate their activities on those areas and localities requiring immediate attention.

Owing to the advanced condition of growth of the sugar cane crop, general systematic inspections were discontinued after the end of August, 1927.

Between the middle of August and the middle of September five demonstrations of mosaic diseased sugar cane stools, showing the symptoms of the disease in its various stages, were given in various parts of the Island for the benefit of persons in all districts. It is unfortunate that on the whole these demonstrations were poorly attended, and that the junior officers on plantations were prevented by circumstances from attending.

In order to deal more effectively with the work of eradication, it was found necessary to delimit certain areas within which persons desirous of planting canes must first make application to, and obtain their cane plants through, this Department from an approved source. These areas, which embraced the most heavily infected districts, are outlined in the Report of the Plant Diseases Inspector included herewith.

Through the kindness and co-operation of the Managements of the plantations, Lears, Sandy Lane, Warleigh and Colleton (St. Peter), the Department was able to make provision for the supply of healthy sugar cane plants to persons desiring to plant canes within the areas proclaimed to be infected areas. To persons whose holdings were less than one acre in area, plants were distributed free; to persons whose holdings were greater than one acre but less than five acres in area, plants were distributed at the rate of sixpence a hundred; and to persons whose holdings were greater than five acres in area, plants were distributed at the rate of one shilling a hundred.

The distribution of cane plants to applicants was begun in October 1927, and continued until May 1928. During this period approximately one million plants were delivered by the Department.

In those areas, constituting the greater portion of the Island, not proclaimed as infected areas, the majority of canes from which plants were cut were inspected previous to plant cutting.

As a first systematic attempt to control the mosaic disease, the inspections and resulting destruction of diseased canes and the distribution of healthy cane plants have given satisfactory results. There is no reason to expect that the disease cannot now be easily prevented from spreading further, and, with the increasing knowledge of the cane planters in the methods of prevention, the percentage infection should soon rapidly diminish. It is essential, however, that each sugar cane grower should realise that he has an important part to play in assisting the Department to eradicate the disease.

The presence of corn, which is very susceptible to the disease and at the same time is the favourite food plant of the insect vector of the disease, has contributed very largely to the considerable amount of "secondary infection" that has occurred. It has frequently happened that in those districts where corn is habitually grown and ratooned, it has become diseased, and has served as a source of infection to the young cane plants as they emerged from the soil. In this way a too great percentage of healthy young plants, grown from healthy plants supplied through this Department, has become infected in the early stages of growth. The plants so infected have been destroyed and fresh plants planted in their places.

The experience gained by the Department in this respect has led to legislation whereby corn may not be grown in specified areas within certain periods of the year if it constitutes a source of infection to the young cane crop. Every effort will be made to minimise the inconvenience this will necessarily cause.

In addition to diseased corn, the presence of diseased old canes in neighbouring fields constitutes a source of infection to the young cane crop, and cane growers would do well to avoid the existence of diseased old canes on their land after the young cane plants have emerged from the soil.

The Report of the Plant Diseases Inspector provides further details, and includes a statement of the cost of the operations from April 1927 to March 1928. The salaries of the Inspectors are not included in the statement.

REPORT OF PLANT DISEASES INSPECTOR FOR YEAR ENDING 31ST MAY 1928.

Mosaic Disease.

I was appointed Temporary Plant Diseases Inspector on 7th April 1927, and assumed duties on that day.

I was instructed by the Assistant Director to visit the tenantries of St. Michael and to discover whether the Mosaic Disease was present and if so to what extent the plots were infected.

A systematic inspection was made through the following districts of St. Michael:—

Bank Hall, Bush Hall, The Kew, Fairfield, Black Rock, Goodland, Cave Hill, Lodge Hill, Hothersal Turning, Jackmans Tenantry, The Ivy Village, My Lord's Hill, Britton's Hill, Bay Estate, Delamere Land, and Weymouth. It was discovered that the Mosaic Disease was present in all of the abovementioned areas, some of these being very heavily infected.

Sub-Inspectors of Plant Diseases were appointed under Section 4 (1) of the Mosaic Disease (Eradication) Act 1927 on June 1st, 1927 and stationed in the different parishes of the Island. It was found during their tours of inspection that the western coastline was infected with the Mosaic Disease and in some instances very heavily. The following areas were therefore proclaimed Infected Areas by His Excellency the Governor on the 14th day of September, 1927, according to Section 10 (1) of the Mosaic Disease (Eradication) Act 1927:—

Parish of St. Michael.

All that area bounded by the Garrison Savannah, Dalkeith Road, Brittons Hill Road, Brittons Cross Road (from top of Britton's Hill Road to Upper Collymore Rock), Upper Collymore Rock and the Main Road passing Highgate and Clapham on the North Side to the Cross Road East of Wildey Plantation to the Main Road East of Sherbourne, to Waterford Factory including Rouen Tenantry and the Belle Tenantry, the Main Road through Waterford Bottom to the Northern Limit of Waterford Plantation, a line drawn from the Northern Boundary of Waterford Plantation West of the Main Road through Water-

ford Bottom to the Northern Boundary of the Parish (including Green Hill, Lodge Hill, the Lodge Plantation, and the Farm Plantation) and finally the Sea Coast.

Parish of St. James.

All that area included in Prospect Land, Paynes Bay, Thorpes Village, Weston, Bagatelle Plantation, and Lancaster Plantation.

Parish of St. Peter.

All that area bounded on the South by Bayfield and Mullins Plantations, on the East by Haymans Plantation, the Farm Plantation, St. Peter's Parish Glebe (excepting that portion of the Glebe abutting on the Farm Road), Rockless Plantation, Ashton Hall Plantation, on the North by Heywoods Plantation, and on the West by the Sea. Also all that area included in Portland and Pleasant Hall Plantations.

Parish of Christ Church.

All that area included in Adam's Castle and Warner's Plantations.

Parish of St. Lucy.

All that area included in Checker Hall, and Checker Hall Tenantry.

Provision was made in the Mosaic Disease (Eradication) Act 1927 compelling persons in the Proclaimed Infected Areas to obtain their plants through the Department of Science and Agriculture. Applications for plants were made on special Forms supplied by this Department and a Certificate of Approval was issued to each applicant. A Certificate of Approval Book was kept at the Office for reference.

Cane plants were distributed from the following places to the different Infected Areas:—

St. Michael	Lears Plantation
St. James	Sandy Lane Plantation
St. Peter	Warleigh Plantation
St. Lucy	Colleton Plantation
Christ Church	From healthy fields on the named Plantations. Plants were cut under the supervision of an Inspector.

The plants were cut from fields on the different estates which were free from infection during the general inspection of April to July last year. Again, the fields were examined just before the plants were cut so as to be able to guarantee that they were free from the Mosaic Disease. Supply plants have also been distributed from time to time since the original planting in November to December, to the Infected Areas.

The general inspection of the young crop which was planted in October to December 1927 commenced in January, 1928, and is being continued until the fields become impassable.

Several estates have been inspected up to this time, and special mention must be made of two places which were heavily infected during the first inspection of 1927.

At one of these places, healthy plants were supplied by the Department in November—December, but on inspection in January—February it was discovered that there was a large number of diseased stools displaying the typical symptoms of "secondary" infection. This was due, no doubt, to the presence in adjoining fields of diseased stools, the infection from which was probably being conveyed by *Aphis maidis,* the insect vector of Mosaic Disease, which was noticed on the canes on one occasion during my several visits in the early part of this year. All diseased plants were removed by the Manager, who assisted the Department with his personal supervision and by supplying labour to remove the diseased plants. The percentage infection at this place has diminished but not as much as was expected, due, no doubt, to the late stage in the reaping season to which the neighbouring diseased canes were allowed to remain.

At the other place, healthy plants were cut during the planting season of 1927 under the personal supervision of an Inspector, who received the assistance of the Manager in supervising the inspection of plants. During the general inspection of March 1928, only 75 diseased holes were found in 83 acres. This is, no doubt, due to proper supervision and inspection of plants during the planting season.

The result of continuous inspection and removal of diseased canes has been satisfactory. The general type of the diminution of the percentage infection as the season advanced is noted by the number of infected holes found in three ½ acre plots in Bank Hall Tenantry on four separate visits. In one of these plots 9, 6, 3 and 2 diseased holes, in another 2, 8, 1 and no diseased holes, and in the third 6, 8, 5 and 2 diseased holes, were found on the four visits respectively. These were removed on each occasion in the presence of the Inspector. The above statement indicates that in this district, which was heavily infected last year, the disease is well under control.

Parish of St. James.

The infection in this district has diminished on the estates that have been inspected up to the present as well as in the tenantries due, no doubt, to the supplying of healthy plants.

Parish of St. Peter.

The infection in the Proclaimed Infected Area has diminished somewhat in this district, but the results obtained have not been as favourable as in the other parishes. This is due to the presence of old corn stumps infected with the Mosaic Disease which were not removed during the planting season. The control of the disease in this district is rendered very difficult on account of the number of plots of ¼ and ⅛ of an acre in area.

Parish of St. Lucy.

At Checker Hall, St. Lucy, where there was a high percentage of infection in 1927, the disease is well under control, only 9 diseased holes being found on the Inspector's first visit this year.

During this year the Department issued two leaflets on the Mosaic Disease. These were distributed to all the estates in the Island, to small landowners in the Proclaimed Infected Areas, and to as many others as possible. The information contained in the leaflets has been appreciated by the planters and others and it has been noted that the advice advocated has been put into practice in many instances.

FUMIGATION.

During April and May 1928, I assisted in the fumigation of imported cotton seed.

EXAMINATION OF PLANTS, ETC.

From time to time I have examined several packages of seeds, bulbs and other plants, sent for examination by the General Post Office and visited the Customs Warehouse to examine imported plants.

FINANCIAL STATEMENT RELATING TO THE WORK OF THE DEPARTMENT PERFORMED UNDER THE MOSAIC DISEASE ERADICATION ACT.

EXPENDITURE.

(a) *Expenditure in connexion with the distribution of healthy cane plants to applicants in the areas proclaimed to be infected.*

Parish of St. Michael.			
Purchase of canes for cutting plants and supplies from Lears Plantation	£516	2	3
Parish of St. James.			
Purchase of canes for cutting plants and supplies from Sandy Lane Plantation	72	7	11
Parish of St. Peter.			
Purchase of canes for cutting plants and supplies from Warleigh Plantation	39	4	5½
Parish of St. Lucy.			
Purchase of canes for cutting plants and supplies from Colleton Plantation	35	2	0
Total	£662	16	7½

(b) *Expenditure in connexion with labour for reaping canes, cutting plants, etc.*

Parish of St. Michael.	£100 13 1
Parish of St. James.	5 0 11½
Parish of St. Peter.	3 4 2
Parish of St Lucy.	1 14 9
Total	£110 12 11½

(c) *Miscellaneous Expenditure.*

Expenses in connection with demonstrations, the destruction and removal of diseased canes, advertisements, etc.	£46 19 3

RECEIPTS.

Parish of St. Michael.		
Sale of cane plants to applicants	£ 75 18 9½	
Sale of canes unfit for use in making plants, to Factory.	47 7 7½	
	£123 6 5	£123 6 5
Parish of St. James.		
Sale of cane plants to applicants	£ 9 12 3	9 12 3
Parish of St. Peter.		
Sale of cane plants to applicants	£ 4 18 8½	
Sale of Syrup manufactured from canes unfit for use in making plants	3 9 4½	
	£ 8 8 1	8 8 1
Parish of St. Lucy.		
Sale of cane plants to applicants	£ 4 6 10½	4 6 10½
TOTAL		£145 13 7½

SUMMARY.

Expenditure in section (a)	£662 16 7½
,, ,, ,, (b)	110 12 11½
,, ,, ,, (c)	46 19 3
	£820 8 10
Receipts	£145 13 7½

D. R. D. WILES,
Plant Diseases Inspector.

ENTOMOLOGICAL NOTES.

Sugar Cane.

The larvae of the beetles *Diaprepes abbreviatus,* Linn. and *Lachnosterna Smithi,* Arrow., which tunnel into the base of the cane stool and destroy a portion of the roots, continue to be two of the major pests of the sugar cane. Every effort should be made by planters to encourage the increase in numbers of *Tiphia parallela,* the hymenopterous parasite of the larva of the brown hardback, *Lachnosterna Smithi,* Arrow. This parasite feeds on secretions on the leaves of the plant, *Cordia interrupta,* and on scale-infested guava plants (*Psidium guajava*). These plants should therefore be planted and encouraged in suitable places in every part of the Island.

The pest which probably causes the greatest damage and consequently the greatest loss to the sugar cane industry is the moth stalk-borer, *Diatraea saccharalis,* Fabr. In April 1927, owing to the kindness and enthusiasm of Mr. Harold E. Box, Chief of the Division of Entomology of the Tucuman Agricultural Experiment Station, Argentine, arrangements were completed for the importation of adult insects of the hymenopterous insects, *Ipobracon grenadensis,* Ashm., and *Microdus* sp., larval parasites of *Diatraea.* The Department is greatly indebted to the kindness and co-operation of Messrs. S. Davson & Co., Ltd., of British Guiana, for permitting the collection of a number of these insects on their estates and their subsequent export to Barbados.

During the months of May, June and July 2,000 parasites, about 95 per cent. of which were *Ipobracon grenadensis* and the remainder *Microdus* sp., were despatched from British Guiana in wire-gauze cages for Barbados. Of these about 1,600 arrived alive and in a healthy condition. One consignment was imported on behalf of the management of Carrington plantation where the insects were released in suitable parts of the plantation.

During the period mentioned about 1,200 of these parasites were received for this Department and were taken to the Experiment Station at Codrington where a number of them were confined in breeding cages previous to release and the remainder released in the experimental canefields of the Station.

In the breeding cages, artificially borer-infested pieces of sugar cane were placed. The parasites located and parasitized the larvae thus introduced. In this way a further batch of parasites was obtained. It was only possible to make arrangements for carrying on the breeding in cages for one or two generations.

It is greatly to be regretted that after the last consignment in July, Messrs. Davson & Co., Ltd., found it impossible to despatch any further parasites.

The parasites released in the cane fields at Codrington established themselves and gradually increased in numbers, so that by October and November several dozen could be observed feeding in the early mornings on the leaves of the *Cordia interrupta* shrubs and the scale-infested guava trees on the borders of the cane fields. The rainy weather of October and November was apparently favourable to the increase of these insects, but after the dry season began the number of insects diminished and by the end of March there were none observed. It is hoped that there still remain a few unobserved which will form a colony and spread into other districts as soon as weather conditions are again favourable.

As soon as circumstances permit, further parasites of *Diatraea* will be introduced.

During the year 10,029 plants of Cordia interrupta were distributed to plantations in all parts of the Island. The managements of plantations should make provision for the planting of a few of these shrubs near to all cane fields.

The moth stalk-borer, *Diatraea saccharalis,* Fabr., is not only a pest in the cane fields, but has also been responsible from year to year for the destruction of a considerable proportion, about 20 to 30 per cent., of the seedling canes in the pot stage at the Experiment Station.

In 1926 when the seedlings in the pot stage were enclosed in the newly constructed "pot immersion cisterns", there was a loss of about 25 per cent. due to *Diatraea* attack.

In 1927, "light traps" were arranged for in the cisterns. An electric light bulb of 10 or 15 candle power is suspended a few inches above the surface of water and oil contained in a shallow tray of about 2 feet cross section. The trays

are placed a few inches above the soil level in the pots. The lights are switched on at dusk and off at dawn. It was observed that during the course of each night a considerable number of moths of *Diatraea* were attracted to the light, fell into the oil and water and were thus entrapped.

On the suggestion of Mr. Harold E. Box, the control of *Diatraea* in the pot immersion cisterns was also attempted in another way. A number of pot plants of the common pasture weed, *Crotalaria retusa*, were placed in the cisterns, and larvae of the lepidopterous insect *Utethezia ornatrix* were collected and placed on this plant, their chief food plant. It happens that the hymenopterous insect, *Trichogramma minutum*, which is parasitic on the eggs of *Diatraea* is also parasitic on the eggs of *Utethezia ornatrix*. Consequently, by encouraging the latter in the cisterns, the egg parasite would also be encouraged, with the expectation that it would also parasitize a number of the *Diatraea* eggs on the seedlings in the cisterns.

It can be added as an observation that, whereas there was a loss of about 25 per cent. of the seedlings in the cisterns in 1927, there was a loss of under 5 per cent. in 1928. This reduction of the percentage loss may be due to a certain extent to the combined effects of the "light traps" and the egg parasite.

MISCELLANEOUS.

Mahogany Twig Borer.

Hypsipyla (*Magiria*) *robusta* Mo. of the family *Pyralidae*, and order *Lepidoptera* is the species whose caterpillar bores the shoots of Mahogany (*Swietenia Mahogani*) and of Toon (*Cedrela toona*) in the Punjab. The damage is extremely characteristic, each shoot dying back from the tip and the pest is a serious obstacle to the growth of these shade trees in some places. An account with figures will be found in Indian Museum Notes, Vol. 1, p. 35 and a fuller one in Vol. V, p. 104. It is also recorded as destroying young plants.

It makes its appearance in Barbados generally in June. The method used for its control was the cutting back of the affected twigs and the tarring of the cut surfaces.

EXPERIMENTAL WORK WITH SUGAR CANE.

The experimental work with sugar cane in general outline comprises the following operations:—

(1) The collection of suitable seed for sowing.
(2) The sowing of seed in seed boxes and the care of the seedlings in the seed box stage.
(3) The potting in six inch pots of a number of the seedlings so grown and their care during the pot stage.
(4) The transplanting of a portion of the seedlings in pots to the experimental fields and their care throughout the growing period.
(5) The selection of a number of the varieties at the end of their growing period.
(6) The planting and care of 2nd and 3rd year seedlings and their elimination as select seedlings.
(7) The planting of select seedlings at Select Stations and their elimination or final selection as commercial varieties.

The abovementioned operations involve a great deal of detailed work, together with the investigation of methods of selection and varietal improvement. The bulk of the work of sections (2) to (6) inclusive is carried out at Codrington Experiment Station.

At this Station, an additional area of ten acres of land has been obtained for experimental work, making a total of approximately 23 acres attached to the Station.

During the year 1927, the Experiment Station at Codrington was provided with an irrigation system consisting of an electrically driven pump and an aermotor pump, connected to a reserve tank of 33,000 gallons capacity, with pipes leading to the experimental fields, in which a system of gutters has been established.

(1)

The origin and collection of suitable seed for sowing is dealt with in the Report of the Acting Assistant Geneticist. In addition to the seed so obtained, seed was obtained from arrows collected from the best commercial varieties in different parts of the Island, the seed-bearing parents only being known.

Owing to the great generosity of the United States Department of Agriculture, it was possible to introduce a few cuttings of certain varieties of Java seedling canes of the P.O.J. series, which had been grown in their quarantine station. These varieties are of considerable importance for the production of arrows for use in the genetical work.

REPORT ON SUGAR CANE GENETICS WORK.

OCTOBER TO DECEMBER, 1927.

(By S. H. Evelyn, D.I.C.T.A.)

Mr. Liebenberg, Assistant Geneticist, resigned his office and left the Colony in June 1927, and the writer held the acting post during the arrowing season, i.e. October to December, of that year.

Owing to a shortage of the Staff in October and to the unfortunate fact that the arrowing season in Barbados coincides with the planting season, the genetic programme could not be carried out in its entirety.

Contrary to the practice followed in the past two years all of the breeding work in 1927 was confined to a single station—namely, Canefield Plantation, as this allowed of a greater amount of work being performed in a limited space of time.

Chosen in 1925 as the seat of the cane breeding work, Canefield Plantation, where almost every cane variety arrows profusely, is situated in the red clay district of St. Thomas parish at an altitude of 1,024 feet above sea level. At this station the rainfall usually averages 80 inches per annum and the temperature ranges between 65° F and 80° F. (18°—27° C.)

Owing to a very favourable year arrows of most of the varieties appeared very early; the earliest recorded case being that of a field of plant canes of the variety Ba. 11569—at Castle Plantation (St. Peter) in which fully opened tassels were observed as early as the 17th of August—the canes being then only 9 months old.

In Barbados, past experience indicates that the best arrows to select for genetic treatment are those which appear earliest in the arrowing season, for should arrow selection be deferred until later in the arrowing season the cane breeder will experience great difficulty in finding arrows free from an infection which will appear in this report under the name of "Tassel Sheath Rot."

Tassel Sheath Rot, as the name implies, is a rot of the sheath enclosing the tassel and in its later stages, of the tassel itself. Judging from external symptoms this fungus infection is similar to that listed in Nowell's "Diseases of Crop Plants" under the name of Leaf Sheath Rot [5] ~~(see figures in (b), (c) and (d) below~~ but this observation has so far not yet been tested.

Almost all of the varieties which arrowed at Canefield during the season suffered somewhat from this disease, but from past observations made, the varieties B. 606, B. 391 and B. 381 appear to be the most susceptible to this tassel-destroying infection.

The infection seems to have its maximum effect during late November and December and it is for that reason that success in arrow selection depends to a large extent on selecting those arrows which appear earliest in the arrowing season. Further reference to this disease will be made later on in this report.

For the above reason the arrows to be worked on were selected as early as possible and the apparatus to be employed was erected before the first of November.

The genetic programme included the following operations :—

(A) Night observations of the time of flower-opening and anther-dehiscence; general field observations on varietal arrowing and of the tassel and floral development of the different varieties; laboratory work to test the male or female properties of the different varieties.

1. Cane Arrow Lanterns *in situ*.

2. Cane Arrow Lanterns over Arrows of barrelled stools.

3. Cane Arrow "Baskets" kept in pails of water. (Lanterns in background.)

4. Cane Arrow Basket showing roots through the sacking.

Photos by the Writer

5. Open crossing with Tassels of barrelled stools.

6. Canes Arrowing in barrels.

7. Canes Arrowing in barrels. (Lanterns in background.)

8. Showing a portion of the barrels in the barrel experiment. (Lanterns in background.)

Photos by the Writer
Stanley H. Evelyn.

(B) The Cane Arrow Lantern Work (4)
(C) The Cane Arrow Basket Work (2)
(D) Open Crossing. (1)

A. Observations and Laboratory Work.

Following the practice, first introduced in Barbados by Liebenberg in November 1926, night observations were made again this season with the view of obtaining time data with regards to flower opening and anther-dehiscence.

The method employed was as follows:—Five arrows of a variety but situated in various parts of the field were selected in the morning and visibly marked. Only tassels on which the first opening of flowers occurred that night were selected.

Beginning from 10.30 p.m. the marked arrows were visited throughout the night and with the use of electric torches the tassels were examined with a hand lens and the time noted at which the first flowers opened. From then onwards the anthers were constantly examined until dehiscence occurred, the time of which was also recorded.

After dehiscence had occurred it was sought to determine the time at which the flowers stopped opening, and the time of maximum dehiscence, the former observation being ascertained by tying red wool just below the flowers which had last opened and observing those marks at various times to see if any further opening of flowers had occurred.

From the results of this work it appears that the relative humidity and the temperature of the atmosphere influence to a great extent the times of flower-opening and of anther dehiscence. For example, it was found that the flowers of the variety B. H. 10 (12), under atmospheric conditions of high relative humidity and low temperature, open around 11—11.30 p.m. and anther dehiscence does not occur until 5—5.30 a.m., whereas in a relatively dry atmosphere of a higher temperature flowers of this variety do not start opening before 12.30 a.m. and anther dehiscence occurs within an hour of the opening of the flowers—that is at 1.30 a.m.

Wind also appears to be an influencing factor. A very strong dry wind that dries out the tassel quickly at the time of anther protrusion appears to cause the anthers to split and shed their pollen earlier than usual and this was especially noticeable in the case of flowers of the variety B. H. 10. (12) as on the nights that anther dehiscence of this variety occurred at 1.30 a.m. a very strong dry wind almost always prevailed.

As is to be expected a certain amount of variation with regard to these time periods occurs amongst the different varieties. For example, the flowers of the variety Ba. 11569 under atmospheric conditions of high relative humidity and low temperature do not start opening before 12.30 a.m. and anther dehiscence does not occur before 7.15 a.m.

A very remarkable case is that of the variety B. 381. The flowers of this variety open at 12 o'clock of one night and only the stigmata protrude from the paleae—the anthers do not emerge from the paleae until about 24 hours later and on emergence shed their pollen almost immediately. This abnormality if constant is worthy of note as probably pollination could be safely performed on flowers of this variety, before anther emergence, at a very small risk of any "selfed" seed occurring.

With regard to the time at which floral opening stops and the time at which maximum shedding of pollen occurs—all the varieties appear to be fairly constant. At 6 a.m. or just a little after, depending on the atmospheric conditions, no further opening of flowers was observed, and 8.30 a.m. appears to be the time at which maximum dehiscence occurs. Following is a table giving the time data of floral development of the varieties observed this season:—

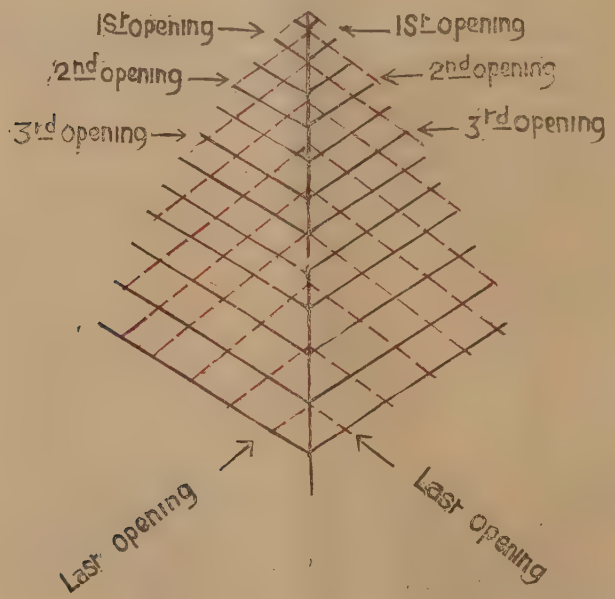
TABLE I.

Variety.	Time Flowers Open.	Time of Dehiscence	Time Flowers Stop Opening.	Time of Maximum Dehiscence
B.H. 10 (12) (Wet Atmos)	11—11.30 p.m.	5—5.30 a.m.	6 a.m.	8—8.30 a.m.
B.H. 10 (12) (Dry Afmos)	12.30 a.m.	1.30 a.m.	6 a.m.	6.30—7 a.m.
Ba. 11569	12.30 a.m.	7.15 a.m.	6 a.m.	8.30 a.m.
Ba. 8069	12.30 a.m.	5—6.00 a.m.	6 a.m.	8.30 a.m.
Ba. 6032	12.30 a.m.	5.30—6 a.m.	6.30 a.m.	8.30 a.m.
B. 417	12.30 a.m.	5.30 a.m.	6 a.m.	8.30 a.m.
B. 391	12.30 a.m.	5—6 a.m.	6 a.m.	8.30 a.m.
B. 374	12.30 a.m.	7.15 a.m.	6 a.m.	8.30 a.m.

It should be recorded that during the observation period, the relative humidity of the atmosphere at Canefield was extremely high. Dew formation occurred very early as seen by the fact that the tassels were always saturated with dew as early as 7.30 p.m. Saturation point (rain) was reached very frequently as can be seen from Table III and these facts should be taken into account before any definite conclusions can be drawn from the information recorded in Table I.

Liebenburg, in 1926, obtained very dissimilar results [4] in comparison with those recorded in Table I; it should, however, be noted that all of his floral observations were confined to tassels enclosed in cane arrow lanterns.

Another observation of purely botanic interest is the manner in which the flowers open on the arrow. Following is a small explanatory diagram: —



LABORATORY WORK.

Following the practice described in Bannier's paper [1] on the breeding work in Java, laboratory work was carried out this season with the object of determining whether a variety should best be used as a male or as a female parent in hybridization work.

Arrows were collected before maximum dehiscence of pollen had occurred, taken to the Laboratory and kept in water. At 8.30 a.m. (time of maximum dehiscence) the anthers were examined for the purpose of recording the percentage dehiscence. The tassels were then shaken over a sheet of glazed dark blue paper on which the pollen fell and was collected. Only four spikelets of each variety were shaken so that a fair comparison of the amount of pollen could be made.

Employing the starch iodine method [1] of determining the viability of the pollen grains, the pollen of 10 varieties was tested this season, results of which will be found in Table II.

Field Observations.

During the day field observations were carried out with the object of obtaining information *re* (a) the early or late arrowing and (b) the extent of arrowing, of the different varieties. Following is a Table giving the results of the observations made:—

TABLE II.

Variety.	Extent of Arrowing.	Early or late Arrowing.	Nature of Ovules.	Amount of Pollen.	Nature of Pollen.
W. Trans.	Strong	V. early	F. fertile	Not tested	Not tested
Sealy Seedling	V. strong	„	Infertile	„ „	„ „
Uba	„	V. late	„	None	—
B.H. 10 (12)	Strong	Late	Mod. Fertile	V. many	Fertile
S.C. 12 (4)	V. strong	Early	Slightly fertile	Not tested	Not tested
Ba. 11569	„	V. early	V. fertile	Few	Infertile
Ba. 8069	V. slight	V. late	Slightly fertile	Many	V. fertile
Ba. 6032	Moderate	„	V. fertile	V. many	„
B.606	Strong	Early	Fertile	Moderate	Fertile
B.417	V. strong	Late	Infertile	V. many	V. fertile
B.391	Strong	Early	V. fertile	„	„
B.381	Slight	Late	Infertile	V. Few	Infertile
B.374	Moderate	Early	V. fertile	V. many	V. fertile
B.67	Slight	„	Infertile	Many	„

Many insects were observed this season visiting the open tassels and in many cases where they were caught and examined their feet and abdomens were covered with pollen. Most noticeable of these were the honey bees which appeared to prefer the flowers of the varieties Sealy Seedling and B. 391 and between 6.30 and 8 a.m. as many as a dozen of these pollen bearing insects could be seen on almost every tassel of the variety B.391. Jassids were observed on tassels of the variety B.67 and thrips and ants on tassels of B.391 and B.606 respectively. These observations suggest that insect pollination probably occurs in the sugar cane.

RAINFALL.

In order to appreciate the conditions under which the genetic work is carried on at Canefield, the appended Tables giving (a) the daily rainfall for the October to December season and (b) the monthly rainfall for the year 1927, are recorded.

TABLE III.

DAILY RAINFALL AT CANEFIELD FOR OCTOBER, NOVEMBER AND DECEMBER 1927.

Date.	October, 1927.			November, 1927.			December, 1927.		
	By Day. Ins.	By Night. Ins.	Total	By Day. Ins.	By Night. Ins.	Total.	By Day. Ins.	By Night. Ins.	Total.
1	...	...	...	...	...	...	·03	·05	·08
2	·07	·15	·22	·11	·08	·19	...	·05	·05
3	...	·15	·15	...	...	...	...	·32	·32
4	...	...	...	...	...	...	·37	·08	·45
5	...	...	...	...	...	...	·50	·10	·60
6	...	·06	·06	·15	...	·15	·35	·46	·81
7	...	·15	·15	1·25	...	1·25	·11	·15	·26
8	·32	·08	·40	...	...	...	·19	05	·24
9	...	·84	·84	...	·30	·30	...	·26	·26
10	·12	...	·12	...	...	...	...	...	...
11	...	...	...	...	·75	·75	...	...	...
12	...	...	...	...	·48	·48	...	·05	·05
13	2·59	...	2·59	...	·03	·03	...	·17	·17
14	...	...	...	2·27	·30	2·57	·18	32	·50
15	1·30	·08	1·38	2·02	·05	2·07	...	...	...
16	30	...	·30	·28	...	·28	...	..	...
17	...	...	...	...	·82	·82	...	..	...
18	...	·06	·06	.10	...	·10	...	·04	·04
19	·24	...	·24	...	·05	·05	...	...	...
20	...	...	...	...	...	...	...	·03	·03
21	..	·10	·10	·09	...	·09	·07	...	·07
22	...	·12	·12	...	·10	·10	...	...	...
23	·07	·45	·52	...	35	·35	...	...	...
24	·35	...	·35	·83	·44	1·27	...	..	...
25	...	...	...	·34	·26	·60	·09	·05	·14
26	...	...	...	·86	...	·86	...	·11	·11
27	...	·60	·60	·32	2·65	2·97	·33	...	·33
28	·55	1·70	2·25	...	...	...	·22	·08	·30
29	...	...	...	...	·05	·05	·11	...	·11
30	...	·35	·35	·03	...	·03	...	...	...
31	...	...	...	...	...	...	...	·10	·10
	Total No. of days—10.	Total No. of Nights—14.	Total Inches 10.80.	Total No. of Days—13.	Total No of Nights—15.	Total Inches 15·36.	Total No. of Days—12.	Total No. of Nights...18.	Total Inches 5·05.

TABLE IV.

MONTHLY RAINFALL AT CANEFIELD FOR 1927.

Station	Jan.	Feb.	March	April	May	June	Total
	5·93	1·84	4·89	6·59	3·85	6 98	
Canefield ...	July	Aug.	Sept.	Oct.	Nov.	Dec.	82·51
	5·76	4·01	11·45	10·80	15·36	5·05	

B. THE CANE ARROW LANTERN WORK.

Forty cane arrows lanterns [2] were erected this season, of which 30 enclosed tassels for "selfing" and the remaining 10 enclosed tassels which were employed for hybridization work.

Observations were made of all "lanterned" arrows with regard to (a) first appearance of tassel and (d) last opening of flowers and these data are

recorded in Table V. It is, however, well to observe that the data recorded are only applicable under the existing conditions of the experiment.

TABLE V.

Variety	1st appearance of Tassel.	1st opening of Flowers	Last appearance of Tassel.	Last opening of Flowers.	Remarks
Ba. 11569	20. 10. 27	24. 10. 27	9. 11. 27	17. 11. 27	Normal arrow
,,	19. 10. 27	23. 10. 27	5. 11. 27	9. 11. 27	,,
,,	18. 10. 27	22. 10. 27	25. 11. 27	28. 11. 27	,,
,,	9. 11. 27	11. 11. 27	20. 11. 27	26. 11. 27	Grown in barrels
,,	5. 11. 27	8. 11 27	15. 11. 27	21. 11. 27	,,
B. 391	15. 10. 27	21. 10 27	..	..	Tassel sheath rot
,,	16. 10. 27	22. 10. 27	..	..	,,
,,	20. 10. 27	26. 10. 27	..	..	,,
B. 606	17. 10. 27	21. 10. 27	..	..	,,
,,	,,	,,	..	..	,,
,,	,,	,,	..	..	,,
B. 417	4. 11. 27	9. 11. 27	..	..	Moth borer
,,	1. 11. 27	5. 11. 27	23. 11. 27	27. 11. 27	Normal arrow
,,	4. 11. 27	7. 11. 27	23. 11. 27	27. 11. 27	,,
,,	6. 11. 27	10. 11. 27	27. 11. 27	..	Tassel sheath rot
,,	2. 11. 27	6. 11. 27	16. 11. 27	18. 11. 27	Normal arrow
B. 374	21.10.27	27. 10. 27	9. 11. 27	18. 11. 27	,,
,,	16. 10. 27	22. 10. 27	3. 11. 27	12. 11. 27	,,
,,	19. 10. 27	25 10. 27	25. 11. 27	29. 11. 27	,,
B. 381	5. 11. 27	8. 11. 27	27. 11. 27	..	Tassel sheath rot
,,	2. 11. 27	7. 11. 27	14. 11. 27	25. 11. 27	,,
,,	31. 10. 27	6. 11. 27	16. 11. 27	23. 11. 27	,,
B. 67	7. 11. 27	12. 11. 27	16. 11. 27	23. 11. 27	Grown in barrels
,,	24. 10. 27	31. 10. 27	5. 11. 27	15. 11. 27	,,
,,	21. 10. 27	28. 10. 27	31.10.27	9. 11. 27	,,
B. H. 10 (12)	2. 11. 27	8. 11. 27	10. 11. 27	24. 11. 27	Normal arrow
,,	31. 10. 27	6. 11. 27	9. 11. 27	16. 11. 27	,,
,,	28 10. 27	5. 11. 27	8. 11. 27	16. 11. 27	,,
,,	31. 10. 27	6. 11. 27	11. 11. 27	17. 11. 27	Normal arrow
,,	4. 11. 27	11. 11. 27	13. 11. 27	23. 11. 27	,,
Ba. 8069	5. 11. 27	7. 11. 27	27. 11. 27	29. 11. 27	,,
,,	6. 11. 27	9. 11. 27	17. 11. 27	29. 11. 27	,,
,,	8. 11. 27	11. 11. 27	20. 11. 27	27. 11. 27	,,
Ba. 6032	2. 11. 27	4. 11. 27	14. 11. 27	19. 11. 27	,,
,,	4. 11. 27	8. 11. 27	15. 11. 27	21. 11. 27	,,
,,	5. 11. 27	7. 11. 27	15. 11. 27	19. 11. 27	,,
,,	2. 11. 27	7. 11. 27	13. 11. 27	20. 11. 27	,,
,,	11. 11. 27	13. 11. 27	22. 11. 27	29. 11. 27	,,
Uba	3. 11. 27	9. 11. 27	13. 11. 27	30. 11. 27	,,
,,	6. 11. 27	12. 11. 27	16. 11. 27	20. 11. 27	,,

As can be seen from the foregoing Table some of the dates are not recorded as in those cases the growth of the tassels was not normal as a result of fungus infection or other causes.

(a) Selfing in Cane Arrow Lanterns.

Three arrows of each of the varieties Ba. 11569, Ba. 8069, Ba. 6032, B.H. 10 (12), B. 606, B. 417, B. 381, B. 374 and B. 67 were enclosed in cane arrow lanterns with the object of obtaining "selfed" seed.

Selfing was carried out with two objects in view:—(1) to test the degree of self-fertility in a variety and (2) in order to attempt to ultimately obtain pure lines.

The only operation carried out in connexion with "selfed" tassels was the daily tapping of the arrow bearing stalk at 8.30 a.m. to encourage the fall and distribution of the pollen on to the stigmata of the same tassel. Following are the germination results:—

TABLE VI.

Variety.	Date Harvested.	Date Sown.	Germination.
Ba.11569	1.12.27	15.12.27	None
"	"	"	"
"	"	"	"
Ba.8069	8.12.27	"	17
"	"	"	50
"	"	"	57
Ba.6032	14.12.27	16.12.27	18
"	12.12.27	15.12.27	24
"	14.12.27	16.12.27	70
B.H.10 (12)	8.12.27	15.12.27	445
"	12.12.27	"	448
"	8.12.27	"	523
B.606	16.11.27	"	None
"	21.11.27	"	"
"	16.11.27	"	"
B.417	8.12.27	"	"
"	12.12.27	"	"
"	10.12.27	"	"
B.391	1.12.27	"	37
"	"	"	None
"	"	"	"
B.381	"	"	"
"	8.12.27	"	"
"	"	"	"
B.374	"	"	118
"	1.12.27	20.12.27	15
"	8.12.27	15.12.27	2
B.67	17.12.27	20.12.27	1
"	7.12.27	15.12.27	None
"	1.12.27	"	"

(b) Crossing in Cane Arrow Lanterns.

Ten arrows, the tassels of which it was sought to hybridize, were enclosed in cane arrow lanterns. Two arrows of each of the varieties Ba. 11569, Ba. 6032, B.H. 10 (12), B. 417 and Uba were selected for this purpose. B. 391 and B. 374, although not enclosed in lanterns were, however, used as male parents in the crossing programme and following is a description of the commercial properties of the varieties employed in this work:—

TABLE VII.

Variety	Sucrose	Tonnage	Relation to Mosaic Disease	Ratooning
Ba.11569	Fairly High	High	Very Susceptible	Good
Ba.6032	Low	Fairly High	Highly Resistant	Fairly Good
B.H.10 (12)	Very High	High	Fairly Susceptible	Good?
B.417	High	Fairly High	Fairly Resistant	Fairly Good
Uba	Very Low	Moderate	Immune	Very Good
B.391	Fairly High	High	Susceptible?	Fairly Good?
B.374	Fairly High	High	Fairly Resistant?	Good?

Nine of the enclosed arrows were treated in the following manner:—From 12.30 a.m. onwards each arrow was tapped at half hour intervals with the object of shaking off the anthers which had already protruded. This treament was found to be very effective as was seen by the large number of anthers which fell quite readily from the tassel so treated. The tassel stalk was held lightly with the fingers and tapping was performed, just below the point at which the tassel stalk was being held, with the back of a clasp knife. If performed carefully it was found that although quite a large number of the anthers were easily shaken off yet the vibration produced by the tapping was not sufficient to cause any damage to the stigmata or any dehiscence of the anthers remaining on the tassel. Between 8 and 8.30 a.m. two arrows of the same variety, to be used as male parents, were collected and taken into the lanterns and shaken over the now partly emasculated tassel.

Pollen from the male arrows falling on to the female tassel was easily visible with the naked eye and in cases in which a thick dust of pollen was not easily discernible, more than two male arrows were used.

In testing the method of deantherizing cane tassels by means of a fine spray of water pumped from a "flit" atomizer, [4] Liebenberg, in 1926, found that although it was impossible to obtain any appreciable success by this method with regard to the removal of the anthers, yet the wetting of the anthers which occurred during the "flitting" was found to retard dehiscence so long as the tassels were kept quite moist.

As a result of this constant wetting, however, a "wet rot" of the tassels occurred which was quickly followed by an attack of tassel sheath rot.

"Flitting" was tested again this season but in a manner slightly different from that practised by Liebenberg in 1926. In place of the water formerly used a 0.005 solution of formalin was tried to determine whether this solution would eliminate the wet rot and fungus infection which occurred last season.

A single "lanterned" arrow of the variety B.H. 10 (12) was used in this experiment and it was flitted from 12 midnight to 5.30 a.m. at half hour intervals. Just before each "flitting" the tassel stalk was tapped, as formerly described, to shake off the protruding anthers. The tassel was at no time sat-

urated with moisture but "flitted" until just a thin film of moisture could be detected. Arrows of the male parent were dusted over the flitted tassel at 8.30 a.m. in the same manner as formerly described.

No "wet rot" or "tassel sheath rot" occurred but it appears that the formalin solution probably had a detrimental effect on pollen grain germination as not a single seedling was obtained from the arrow.

On comparing the germination of the crosses in the following Table with the germination of the selfs in Table VI, one is instantly struck with the fact that although certain varieties on "selfing" gave either no seedling or very few, yet the same varieties on crossing showed a very good germination, indicating that a fair measure of success attended the hybridization work.

TABLE VIII.

Origin of Seed	Date Harvested	Date Sown	Germination
B.417† x B.391‡	21.11.27	15.12.27	None
B.H.10 (12)† x Ba.6032‡	10.12.27	16.12.27	1384
Ba.6032† x B.H.10 (12)‡	12.12.27	15.12.27	39
Ba.6032† x B.391‡	19.12.27	21.12.27	1962*
Ba.11569† x B.391‡	17.12.27	20.12.27	1104
Ba.11569† x B.H.10 (12)‡	14.12.27	16.12.27	1691*
B.417† x Ba.6032‡	9.12.27	15.12.27	47
Uba† x B.H.10 (12)‡	„	„	4
Uba† x B.417‡	8.12.27	„	None
B.H.10 (12)† B.374‡	1.12.27	„	„

† denotes female parent.
‡ „ male „

The cross B. 417 x B. 391 failed to produce any seedlings due to the agency of a moth borer larva, (*Diatraea saccharalis*), which tunnelled up the tassel stalk and so destroyed the tassel before any seed could mature.

* It is interesting to note from the above Table that in both cases of very high germination the seed was sown two days after harvesting. This raises a big question.

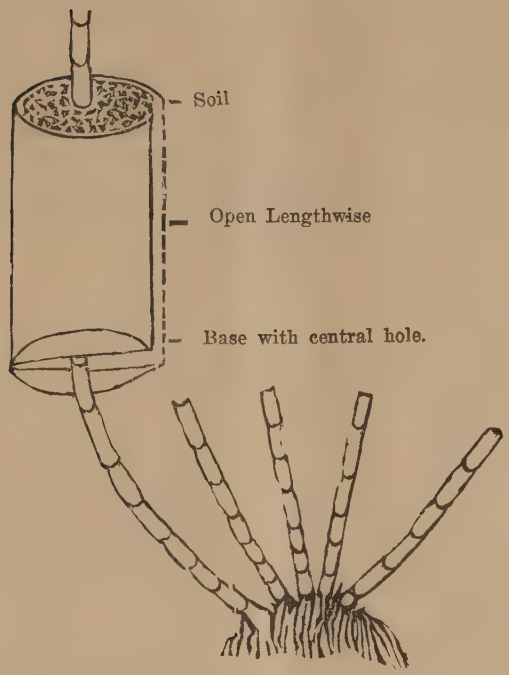
C. The Cane Arrow Basket Work.

In recent years one of the chief aims of the cane breeders in the several sugar cane growing countries has been to devise a method whereby cane tassels can be isolated and made accessible so that they can be easily hybridized with a minimum risk of cross pollination with unintended pollen.

Wilbrink in Java and Venkatraman in India working with this object in view devised the method of artificially inducing the rooting of the arrow bearing stalk and that being accomplished the stalk is removed from the field and isolated in a place free from foreign pollen and where the tassel can be easily handled.

Liebenberg, in 1926, replaced the tile pots employed in Venkatraman's method [6] with wire netted cages lined with sacking (bag). The wire netted cage or as it is now called for convenience a cane arrow basket [4] consists of a cylindrical wire netted frame 18 inches long and 9 inches in cross section at the basal end of which is a circular block of wood with a central hole to admit of the cane stalk and this together with the sacking with which the frame is lined maintains the soil in position. For the basket to be easily fitted around the desired stalk it is open lengthwise and joined together after it has been fitted. Following is a diagram:—

DIAGRAM No. 2.



Past experience in Barbados has shown that best results are obtained by treating the cane high up rather than by treating it at its base. Again, many soil, sand and manure mixtures were tried as rooting media but the most satisfactory results were obtained from using the surface soil of the cane hole in which the stalk to be treated was growing

The Treatment.

At the first visible signs of arrowing, stalks were selected and marked. The basket was put around the stalk at a height of two or more feet from the ground depending on the length of the cane, joined together with wire and suspended with wire from the same stalk at about a foot from the top of the basket. Trash was put into the bottom of the basket to keep in the soil and the basket then filled with the surface soil of the cane hole. During this operation the treated stalk is kept as central as possible in relation to the basket so that it is surrounded by an equal amount of soil. A length of wire was now passed around some of the other stalks of the stool including the treated stalk so as to prevent the treated stalk with its added weight from breaking.

One hundred baskets were fitted this season and each basket was watered twice daily until time of removal from the field. Each treated stalk was examined daily and at the first emergence of the tassel the stalk was severed from the clump at about six inches below the base of the basket, the cutting being performed under water.

After removal from the field three methods of keeping the tassels alive were employed:—(1) 30 treated stalks plus their baskets were planted in half barrels and kept under cover of a plant conservatory, (2) 30 were planted in half barrels and kept in the open under trees, and (3) the remainder were kept in pails of water and the water was changed daily. In the two former cases the stalk was cut flush with the base of the basket before planting.

Hybridization was attempted in the following manner:—Basketed canes, of the two varieties it was sought to cross, were planted in adjoining barrels and as the first flowers opened on the tassels of these canes the stalks were tied

together so that the male tassel was slightly above the female tassel. Every morning the stalk of the male tassel was tapped to encourage the fall and distribution of the pollen on to the stigmata of the female tassel. The crossing programme of the basketed canes was unfortunately curtailed due to press of other work; it is, however, gratifying to note that from 17 tassels a total germinaion of 7,395 seedlings was obtained.

Due to the ravages of tassel sheath rot, wind and other causes and to insufficiency of data from the past season only 25% of the tassels were ultimately sown; with more attention, however, this method should be, undoubtedly, attended with greater success. Following are the germination results.

TABLE IX.

Tassel Bearing Parent or Parents	Method	Date Harvested	Date Sown	Germination
Ba.11569 (left alone)	(3)	9.12.27	15.12.27	42
Ba.11569 (tied with) B.391	(1)	14.12.27	16.12.27	1658
B.391	(2)	17.12.27	21.12.27	1311
B.391	(2)	14.12.27	17.12.27	1058
B.391	(2)	17.12.27	21.12.27	2762
B.391 (left alone)	(2)	14.12.27	16.12.27	142
B.391	(2)	14.12.27	17.12.27	4
B.391 (left alone)	(1)	19.12.27	21 12.27	157
B.391 (tied with) B.417	(1)	19.12.27	24.12.27	140
B.391 (left alone)	(3)	17.12.27	21.12.27	182
Ba.6032 (left alone)	(2)	17.12.27	21.12.27	42
Ba.6032 (left alone)	(2)	17.12.27	21.12.27	15
Ba.6032 (tied with) B.417	(2)	24 12.27	24.12.27	45
Ba.6032 (tied with) B.H.10 (12)	(1)	24.12.27	24.12.27	49
Ba.6032 (left alone)	(1)	19.12.27	24.12.27	17
Ba.6032	(1)	14.12.27	16.12.27	16
Ba.6032	(1)	24.12.27	31.12.27	55
Ba.11569 (tied with) B.391	(1)	30.11.27	15.12.27	None
Ba.11569 (tied with) Ba.6032	(1)	29.11.27	15.12.27	„
B. 417 (tied with) Ba. 6032	(2)	14.12.27	17.12.27	„
B. 417	(2)	14.12.27	17.12.27	„
B. 391 (tied with) Uba	(1)	9.12.27	15.12.27	„
Uba (tied with) B. 417	(1)	10.12.27	20.12.27	„
Uba (tied with) B. 391.	(1)	10.12.27	15.12.27	„
B. H. 10 (12) (tied with) Ba. 11569	(1)	10.12.27	16.12.27	„

As has already been stated, each basket was visited daily so that careful records could be obtained re the rooting and the tassel development of each arrow. In the Table which follows the column headed "First Signs of Roots," means the first appearance of roots through the sacking of the basket. On comparing the data of the tassel development of "basketed" stalks with similar data of "lanterned" arrows recorded in Table V, the effect which the rooting treatment has on the development of the "basketed" tassels will be noted.

TABLE X.

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel.	Last Opening of Flowers.	Remarks.
Ba. 11569	20. 10. 27.	28. 10. 27.	5. 11. 27	5. 11. 27	30. 11. 27	4. 12. 27	Broken by wind.
,,	,,	,,	27. 10. 27	31. 10. 27	..	..	,,
,,	,,	Did not root	,,	,,	..	..	Discarded
,,	,,	1. 11. 27.	,,	,,	..	..	Tassel sheath rot
,,	,,	28. 10. 27.	,,	,,	20. 11. 27	21. 11. 27	Normal
,,	,,	,,	28. 10. 27	5. 11. 27	..	..	Abnormal arrow
,,	21. 10. 27	,,	10. 11. 27	12. 11. 27	29. 11. 27	7. 12. 27	Normal
,,	,,	Did not root	9. 11. 27	10. 11. 27	..	..	Discarded
,,	,,	30. 10. 27.	4. 11. 27	7. 11. 27	28. 11. 27	..	,,
,,	,,	12. 11. 27.	..	..	..	..	Rat eaten
,,	25. 10. 27.	31. 10. 27.	6. 11. 27	10. 11. 27	..	..	Tassel sheath rot
,,	,,	4. 11. 27.	..	..	..	..	Abnormal arrow
,,	,,	31. 10. 27.	17. 11. 27	19. 11. 27	30. 11. 27	..	Broken by wind
,,	,,	1. 11. 27.	9. 11. 27	9. 11. 27	27. 11. 27	..	Tassel sheath rot
,,	,,	31. 10. 27.	12. 11. 27	18. 11. 27	..	..	,,
,,	,,	2. 11. 27.	11. 11. 27	12. 11. 27	..	..	,,
,,	,,	1. 11. 27.	..	..	..	..	,,
,,	,,	,,	30. 10. 27	3. 11. 27	..	..	Broken by wind

TABLE X.—(*Continued*).

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel	Last Opening of Flowers.	Remarks.
B. 417	21. 10. 27	28. 10. 27	12. 11. 27	17. 11. 27	..	..	Tassel sheath rot
,,	,,	29. 10. 27	,,	,,	..	..	,,
,,	,,	28. 10. 27	14. 11. 27	15. 11. 27	..	..	,,
,,	,,	,,	..	..	..	..	,,
,,	,,	29. 10. 27	..	..	..	..	,,
,,	,,	,,	..	..	..	..	,,
,,	,,	26. 10. 27	..	..	..	..	,,
,,	,,	30. 10. 27	7. 11. 27	11. 11. 27	..	..	,,
,,	,,	27. 10. 27	..	..	..	..	,,
,,	,,	26. 10. 27	..	..	..	..	,,
,,	25. 10. 27	31. 10. 27	18. 11. 27	23. 11. 27	..	..	,,
,,	,,	3. 11. 27	21. 11. 27	26. 11. 27	..	..	,,
,,	,,	31. 10. 27	16. 11. 27	21. 11. 27	6. 12. 27	11. 12. 27	Normal arrow
,,	,,	3. 11. 27	20. 11. 27	27. 11. 27	30. 11. 27	8. 12. 27	,,
,,	,,	12. 11. 27	..	..	..	..	Tassel sheath rot
,,	,,	31. 10. 27	..	..	..	..	,,
,,	,,	5. 11. 27	..	..	..	..	,,
,,	,,	31. 10. 27	15. 11. 27	19. 11. 27	..	..	,,

TABLE X.—(*Continued*).

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel.	Last Opening of Flowers.	Remarks.
B. 391	21. 10. 27	27. 10. 27	..	..	..	..	Moth borer
"	"	28. 10. 27	5. 11. 27	13. 11. 27	29. 11. 27	7. 12. 27	Normal arrow
"	"	27. 10. 27	31. 10. 27	11. 11. 27	18. 11. 27	..	Tassel sheath rot
"	"	28. 10. 27	2. 11. 27	..	..	..	"
"	"	28. 10. 27	7. 11. 27	11. 11. 27	28. 11. 27	6. 12. 27	Normal arrow
"	"	27. 10. 27	30. 10. 27	10. 11. 27	..	..	Tassel sheath rot
"	"	28. 10. 27	2. 11. 27	16. 11. 27	27. 11. 27	29. 11. 27	Normal arrow
"	"	28. 10. 27	3. 11. 27	11. 11. 27	29. 11. 27	7. 12. 27	"
"	"	28. 10. 27	10. 11. 27	17. 11. 27	30. 11. 27	..	Tassel sheath rot
"	"	31. 10. 27	..	..	..	..	See foot note
"	25. 10. 27	1. 11. 27	..	..	..	..	"
"	"	31. 10. 27	22. 11. 27	28. 11. 27	30. 11. 27	7. 12. 27	Normal arrow
"	"	2. 11. 27	12. 11. 27	17. 11. 27	29. 11. 27	7. 12. 27	"
"	"	31. 10. 27	15. 11. 27	23. 11. 27	30. 11. 27	7. 12. 27	"
"	"	31. 10. 27	16. 11. 27	24. 11. 27	30. 11. 27	8. 12. 27	"
"	"	31. 10. 27	14. 11. 27	17. 11. 27	30. 11. 27	7. 12. 27	"

TABLE X.—(*Continued*).

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel.	Last Opening of Flowers.	Remarks.
Uba	22. 10. 27	6. 11. 27	..	..	..	..	Tassel sheath rot
,,	27. 10. 27	..	..	..	..	..	,,
,,	,,	14. 11. 27	14. 11. 27	22. 11. 27	29. 11. 27	3. 12. 27	Normal arrow
,,	22. 10. 27	3. 11. 27	6. 11. 27	13. 11. 27	20. 11. 27	29. 11. 27	,,
,,	,,	31. 10. 27	6. 11. 27	12. 11. 27	28. 11. 27	29. 11. 27	,,
,,	,,	31. 10. 27	8. 11. 27	..	..	..	Broken by wind
,,	,,	3. 11. 27	7. 11. 27	13. 11. 27	..	..	,,
,,	22. 10. 27	6. 11. 27	8. 11. 27	16. 11. 27	..	..	,,
,,	,,	28. 10. 27	9. 11. 27	17. 11. 27	20. 11. 27	28. 11. 27	Normal arrow
,,	,,	1. 11. 27	8. 11. 27	16. 11. 27	21. 11. 27	29. 11. 27	,,
,,	25. 10. 27	4. 11. 27	8. 11. 27	16. 11. 27	30. 11. 27	7. 12. 27	Broken by wind
,,	,,	Did not root	10. 11. 27	19. 11. 27	..	..	Discarded
,,	,,	,,	9. 11. 27	18. 11. 27	..	..	,,
,,	,,	2. 11. 27	12. 11. 27	19. 11. 27	30. 11. 27	..	Broken by wind
,,	,,	3. 11. 27	6. 11. 27	16. 11. 27	24. 11. 27	3. 12. 27	Normal arrow
,,	,,	4. 11. 27	11. 11. 27	18. 11. 27	27. 11. 27	30. 11. 27	Broken by wind

TABLE X.—(*Continued*).

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel.	Last Opening of Flowers.	Remarks.
B. H. 10 (12)	24. 10. 27	1. 11. 27	16. 11. 27	21. 11. 27	30. 11. 27	..	Tassel sheath rot
,,	,,	1. 11. 27	18. 11. 27	..	..	..	,,
,,	,,	30. 10. 27	21. 11. 27	23. 11. 27	30. 11. 27	9. 12. 27	,,
,,	,,	31. 10. 27	15. 11. 27	20. 11. 27	30. 11. 27	6. 12. 27	Normal arrow
,,	,,	30. 10. 27	..	..	..	..	Tassel sheath rot
,,	,,	1. 11. 27	21. 11. 27	..	..	..	,,
,,	,,	30. 10. 27	2. 12. 27	..	..	..	See foot note*
,,	,,	2. 11. 27	..	..	..	..	,,
,,	,,	2. 11. 27	..	..	..	..	,,
,,	,,	Did not root	14. 12. 27	..	..	..	Discarded
,,	26. 10. 27	3. 11. 27	26. 11. 27	..	..	..	Tassel sheath rot
,,	,,	2. 11. 27	..	..	..	..	,,
,,	,,	31. 10. 27	27. 11. 27	29. 11. 27	..	..	Broken by wind
,,	,,	31. 10. 27	24. 11. 27	25. 11. 27	1. 12. 27	8. 12. 27	Tassel sheath rot
,,	,,	1. 11. 27	..	..	..	..	Broken by wind
,,	,,	1. 11. 27	..	..	..	..	,,

TABLE X.—(*Continued*).

Variety.	Date Basketed.	First Signs of Roots.	1st Appearance of Tassel.	1st Opening of Flowers.	Last Appearance of Tassel.	Last Opening of Flowers.	Remarks.
Ba. 6032	24. 10. 27	6. 11. 27	13. 11. 27	14. 11. 27	..	..	Tassel sheath rot
,,	,,	5. 11. 27	17. 11. 27	18. 11. 27	..	..	,, Discarded
,,	,,	Did not root	15. 11. 27	16. 11. 27	..	..	Tassel sheath rot
,,	,,	8. 11. 27	16. 11. 27	17. 11. 27	..	..	Normal arrow
,,	,,	31. 10. 27	20. 11. 27	21. 11. 27	30. 11. 27	8. 12. 27	Broken by wind
,,	,,	3. 11. 27	21. 11. 27	..	..	..	Normal arrow
,,	,,	30. 11. 27	22. 11. 27	23. 11. 27	30. 11. 27	8. 12. 27	,, Discarded
,,	,,	1. 11. 27	16. 11. 27	17. 11. 27	29. 11. 27	8. 12. 27	Normal arrow
,,	,,	Did not root	19. 11. 27	20. 11. 27	..	..	,, Discarded
,,	,,	2. 11. 27	12. 11. 27	14. 11. 27	29. 11. 27	30. 11. 27	Normal arrow
,,	,,	5. 11. 27	20. 11. 27	22. 11. 27	30. 11. 27	8. 12. 27	,, Discarded
,,	26. 10. 27	3. 11. 27	20. 11. 27	21. 11. 27	3. 12. 27	8. 12. 27	,, Discarded
,,	,,	Did not root	21. 11. 27	22. 11. 27	..	..	,, Broken by wind
,,	,,	,,	20. 11. 27	21. 11. 27	..	..	,, Broken by wind
,,	,,	6. 11. 27	22. 11. 27	25. 11. 27	1. 12. 27	..	Normal arrow
,,	,,	5. 11. 27	18. 11. 27	19. 11. 27	30. 11. 27	10. 12. 27	,, Discarded

* The five arows to which this note refers, were peculiar in that soon after the baskets were fitted, the buds above the baskets began to shoot and the growth of the tassels was arrested. This was probably due to the fact that instead of the food going up towards the arrows and so helping their development, it was arrested at the nodes above the baskets and caused the normally dormant buds to shoot.

Again it must be remembered that the data recorded above are only applicable under the existing conditions of the experiment.

D. Open Crossing.

At the Pasoeroean Cane Breeding Station in Java, many methods of hybridizing cane varieties have been tried out, but the method which has, so far, given best results is that of "Open Crossing" [1] and this method was tested out this season on a very small scale.

Three tassels of the variety Ba. 11569 were selected and employed as the female tassels and two of these were surrounded with arrows of the variety B. H. 10 (12) and the other with arrows of the variety Ba. 6032.

On the morning of the first opening of flowers on the "female" tassels, arrows of the male varieties were cut and put around the female tassels with the base of their stalks in pots of water.

Six male arrows were found to be sufficient to enclose the female tassel entirely, and the operation was carried out a little before 8.30 o'clock in the morning so that maximum dehiscence of anthers occurred soon after the completion of the whole operation. A length of stick supported each of the female tassels and to this were tied the male arrows so that the latter were just a little above the female tassel for the purpose of obtaining successful pollination.

At 7.30 to 8 o'clock every morning the male arrows, having dried out, were removed and the water-holding pots were cleaned out and refilled and fresh male arrows cut and set up. The female tassel was examined daily to ascertain the date at which the last flowers opened and on the day of this development the last set of male arrows were set up. After this date the female tassel was left alone so that the seeds could mature. On maturity it was harvested and the seed sown. Following is a Table recording the germination of the seeds of the tassels so treated.

TABLE XI.

Tassel Bearing Parents.	Date Harvested	Date Sown	Germination.
Ba. 11569 † x B.H. 10 (12) ‡	17. 12. 27	21. 12. 27	423
Ba. 11569 † x B.H. 10 (12) ‡	,,	,,	365
Ba. 11569 † x Ba. 6032 ‡	,,	,,	980

† denotes female parent. ‡ denotes male parent.

E. Canes Arrow in Barrels.

In October, 1926, the writer suggested growing canes in barrels with the objects (1) of obaining cane arrow tassels accessible to the cane breeder for hybridization work and (2) of seeing whether canes would arrow in barrels so that an experiment for determining the arrowing stimulus or stimuli of the sugar cane could be carried out.

Owing to the press of work at that period occasioned by the carrying out of certain physiological and genetic experiments, the "barrel" problem was tried only on a very small scale and not as fully as ouflined by the writer.

As with the other work Canefield plantation was chosen as the site of the experiment. Sixty full-sized cement barrels were employed in the experiment and ten of these were planted at intervals of every two months with the object of determining the period most suitable to the production of arrows. The first ten barrels were planted at the end of December 1926 and the last 10 at the end of October 1927.

Cuttings of Ba. 11569, a flowering variety, and of the variety B. 67 which very rarely flowers, were planted in well mixed local soil contained in the barrels and treated manurially in the usual estate manner. For the first few months of their growth the cuttings were watered daily. Following are the results:—

TABLE XII.

Variety.	Date Planted.	Number of Arrows Produced in October 1927.
Ba. 11569	24. 12. 26	1
"	"	2
"	"	1
B. 67	"	2
"	"	2
"	"	2
Ba. 11569	25. 2. 27	2
"	"	2
"	"	1
"	"	4
"	"	3
B. 67	"	1
"	"	1
Ba. 11569	30. 4. 27	1

It should be noted that:—

(a) Of the 10 barrels planted on the 24. 12. 26 six of the "barrelled" stools arrowed giving a total of 10 arrows.

(b) Of the 10 barrels planted on the 25. 2. 27 seven of the "barrelled" stools arrowed giving a total of 14 arrows at the end of 8 months' growth.

(c) Of the 10 barrels planted on the 30. 4. 27 it is remarkable that one of the "barrelled" stools should have arrowed in October i.e. after 6 months' growth.

(d) The Departmental Plot of the variety B. 67 did not form a single arrow in 1926 as plant canes or in 1927 as first ratoons, whereas 5 "barrelled" stools of this variety planted in the same soil and climatic environment, produced 8 arrows, 6 after 10 months' growth and 2 after 8 months' growth.

(e) The arrows produced from "barrelled" stools were quite normal and the writer employed eight of them in this season's breeding programme. Three arrows of the variety B. 67 were "selfed" in three "arrow lanterns" [2], two arrows of the variety Ba. 11569 were "crossed" in two "arrow lanterns" and three of the latter variety were "open crossed" [1]. Following are the results of the germination.

TABLE XIII.

Origin of Seed.	Method Employed.	Number of Seedlings.
B. 67	Selfed in Arrow Lantern	1
"	"	0
"	"	0
Ba. 11569 † x B. 391‡	Dusted in Arrow Lantern	1104
Ba. 11569† x B.H. 10 (12)‡	"	1691
Ba. 11569† x B.H. 10 (12)‡	Open crossed	423
Ba. 11569‡ x B.H. 10 (12)‡	"	365
Ba. 11569 † x Ba. 6032 ‡	"	980

‡ denotes male parent. † denotes female parent.

(f) The pollen of the variety B. 67 was tested by the starch iodine test [1] and found very fertile, and so the poor germination which resulted from the sowing of the seeds of three "selfed" tassels of this variety must be attributed to some cause other than pollen sterility.

(g) As can be seen from the germination results five arrows from "barrelled" stools produced 4,563 seedlings, showing that these arrows were normal and were used successfully in hybridization work.

REMARKS.

In the last few years many difficult and laborious methods have been devised with the object of obtaining and isolating live arrows accessible to the cane breeder. There is the Hawaiian method [7] of keeping the cane arrows normally developing by immersing the bottom joints in a 1 in 2000 per cent. solution of SO_2. There is the Indian method [6] of treating the arrowing stalk for root development by packing moist soil around the stalk about to arrow, the soil being kept in position by tile and after rooting is assured the stalk is removed from the field and taken to the laboratory where the tassel can be genetically treated. A modification [4] of this method was made by this Department in 1926, in which wire netted cages lined with sacking, were used instead of tile pots. Finally, there is the new Hawaiian method [3] of removing a stalk which is going to arrow and slipping a portion of the inner tube of an automobile tire over the cut end of the stalk and filling the rubber container with a nutrient solution which induces rooting. After an adequate root system is formed the tire is stripped off and the stalk planted in a convenient location.

It is obvious that these methods entail much careful and accurate work by trained workmen and can only be worked successfully where the desired arrows are located in close proximity to a genetic laboratory. In comparison arrows produced from "barrelled" stools give the same results but with a minimum chance of failure and for the following reasons:—The production of such arrows can be accomplished by an ordinary field labourer; the arrows of themselves stand little chance of getting damaged as they are supported by their own root system and are sheltered by the other stalks of the stool; and last but most important is that the "barrelled" arrows can be easily moved to any desired location without any fear of their tassels being damaged.

Owing to the success which attended the "barrel" work this season 96 more barrels have been planted this year for further experimentation.

The following Table records the total number of seedlings which were obtained from the season's breeding work:

TABLE XIV.

Seedlings from:—	Total Number of Tassels	Total Number of Seedlings.
Arrow "Lanterned" Tassels	21	8,091
Arrow "Basketed" Tassels	17	7,395
"Open Crossed" Tassels	3	1,768
	41	17,254

REFERENCES.

1. Bannier, J. P. Arch. Suikerindus. Nederland.-Indie, No. 19, pp. 550 and 552, Jaargang 1926
2. d'Albuquerque, J. P. B'dos Agri. Rpt. on Sugar Cane Expts., p. 3, 1924-26.
3. Hance, F. E. Haw. Plant. Rec. XXXI, pp. 362-367, 1927.

4. Liebenberg, L. C. C. B'dos Agri. Rpt. on Sugar Cane Expts., 1925-27.
5. Nowell, W. Diseases of Crop Plants in the Lesser Antilles, p. 316.
6. Venkatraman, T. S. Indian Agri. Jour. XXI, p. 203, May 1926.
7. Verret, J. A. Haw. Plant. Rec. XXIX, No. 1, pp. 84-94, Jan. 1925.

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(2)

The usual arrangements obtained for the sowing of seed, 1,000 boxes being sown. There was an excellent germination.

(3)

In selecting seedlings for potting, the former practice of pricking out the largest seedlings from a box was discontinued; all seedlings, provided they were of a healthy appearance, were pricked out until the total number to be potted from each variety had been obtained. Altogether 20,000 seedlings were potted and placed in the pot immersion cisterns provided for the purpose, and watered therein by an immersion system.

The following note is of interest in connexion with the selection of young seedling canes.

NOTE ON A POSSIBLE MEANS OF SELECTION OF YOUNG SEEDLING CANES.

(By S. H. Evelyn).

In trying to obtain some particular indication whereby sugar cane varieties could be selected or discarded in their seedling stage, Liebenberg divided the seedlings into various descriptive characters one of which was colour.

One seedling representative of each of the following colours, namely:—dark green, light green, yellow green, red, red brown, brown, light brown, and yellow, was selected and these eight seedlings were used as standards with which to match the colour of the remaining seedling.

The seedlings of the following varieties B. 374, B. 391, B. 606, B. 663 B.H. 10 (12), Ba. 11569 and S.C. 12 (4) were employed for this experiment and these were sown between the dates of the 14th and 20th of December 1926 and the death rates for each colour group were recorded on the 27th of February 1927, that is, about a month after the seedlings were potted. The results are appended in Tables I and II.

TABLE I.

PER CENT. MORTALITY IN COLOUR GROUPS OF EACH VARIETY OBSERVED.

Colour.	B.374	B·391	B·606	B.663	B.H. 10 (12)	Ba. 11569	S.C. 12 (4)
Dark green ...	3·8	0·0	0·0	0·0	36·4	0·0	37·5
Light „ ...	41·6	19·0	21·0	15.4	41·9	12·0	27·3
Yellow ...	30·4	39·3	54·0	40·0	54·2	32·5	47·1
Red ...	33·3	66·6	33·3	36·4	50·0	33·3	60·0
Red brown ...	56·5	20·0	25·0	45·0	39 0	44·0	50·0
Brown ...	31·2	66·6	37·1	51·4	50·0	28·1	52·9
Light brown ..	41·4	38·1	31·8	30·6	32·1	14·8	22·2
Yellow ...	72·3	55·5	58·8	65·0	100·0	70 5	56·0

TABLE II.

PER CENT. MORTALITY IN COLOUR GROUPS FOR ALL VARIETIES.

Colour.	Total Number.	Total Deaths	Percentage
Dark green	78	8	10.3
Light green	277	66	23.8
Yellow green	262	112	42.7
Red	38	16	42.1
Red brown	210	91	43.3
Brown	154	64	41.6
Light brown	230	68	29.6
Yellow	246	164	66.6

From the Tables it will be observed that the mortality among seedlings coloured other than dark and light green is consistently high. This would appear to indicate that if any selection were practised at the potting out stage it would be safer to choose plants belonging to the group showing a lower mortality, viz: dark and light green seedlings.

It is interesting to note the high mortality prevailing among seedlings of a yellow colour.

(4)

Seedlings were transplanted into the experimental fields at the end of April and early in May under irrigation.

(5)

The first year seedlings planted in 1927 were reaped in March 1928.

(6)

Plots of third year seedlings were planted at Dodds (black soil) and Vaucluse (red soil) in November 1927. Plots of second and third year seedlings were planted at Codrington in April under irrigation.

The details of the work involved in sections (5) and (6) will be dealt with by the Geneticist in next year's Report. Dr. McIntosh joined the staff at a late stage in the season, and his report will therefore be included in the next Report.

NEW SELECT SEEDLINGS.

The following varieties were included for the first time as select seedlings and planted at the Select Seedling Stations in November—December, 1927:—B. 721, B. 735, B. 755, B. 759, B. 835 and B. 891.

Results of yield in tons of canes per acre and pounds of saccharose per acre of the three best varieties are given below.

Variety.	Name of Station.	Yield in Tons Per Acre.	Yield in Saccharose Per Acre, lb.
B. 721	Buckden	35.0	11,897
	Lears	41.8	12,776
B. 755	Mt. Wilton	37.9	13,051
	Lemon Arbor	42.8	13,556
	Carrington	33.6	11,583
B. 891	Waterford	39.9	12,688
	Ridgeway	34.1	12,902

(7)

SEEDLING SUGAR CANE VARIETY TRIALS

A list of the Stations at which select seedlings were planted is subjoined. In the list the Stations are separated into arbitrary groups. There is probably more jusification for the separation into such groups on the grounds of rainfall distribution, rather than of differences in soil type.

SELECT SEEDLING STATIONS.

Low Black Soils	Graeme Hall Plantation	Christ Church
	Coverley "	" "
	Hannays "	" "
	Carrington "	St. Philip
	Hampton "	" "
	Brighton "	St. George
	Waterford "	St. Michael
	Sandy Lane "	St. James
	Warleigh "	St. Peter
	Pickerings "	St. Lucy
Medium Black Soils	Ridgeway "	St. Thomas
	Newcastle "	St. John
	Lears "	St. Michael
Medium Red Soils	Clifton Hall "	St. John
	Lemon Arbor "	St. John
	Vaucluse "	St. Thomas
	Springhead "	St. James
High Red Soils	Blackmans "	St. Joseph
	Buckden "	St. Joseph
	Lion Castle "	St. Thomas
	Mount Wilton "	St. Thomas
Scotland District	Baxters .. "	St. Andrew

RESULTS OF VARIETY TRIALS.

The results of the variety trials have been statistically analysed by the Agricultural Chemist and are presented in the following Tables together with a summary of the results.

Following the Tables dealing with the yield of cane and saccharose per acre, there are Tables setting forth the average composition of the cane and juice of the several varieties tested.

A Table showing the monthly rainfall at the Select Seedling Stations is also included (Appendix III).

PLANT CANES.

(a) RED SOILS.

GROUP I.

Centres. Mt. Wilton, Buckden, Lemon Arbor, Springhead.

Sandard Error of Difference between Mean Yields=2.08 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B.H. 10 (12)	39.4	B.H. 10 (12)	13552
B. 381	38.5	B. 381	12546
B. 374	36.4	B. 472	12231
B. 472	35.8	B. 374	12145
B. 663	34.4	B. 663	10334
B. 606	32.6	S.C. 12 (4)	9767
S.C. 12 (4)	29.9	Ba. 11569	9646
Ba. 11569	29.4	B. 606	9532
B. 417	28.7	B. 417	9103

A difference between mean yields of 4.15 tons of cane or 1,495 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP II.

Centres. Lion Castle, Blackmans, Clifton Hall, Vaucluse.

Standard Error of Difference between Mean Yields = 2.55 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B.H. 10 (12)	43.2	B.H. 10 (12)	14732
B. 689	38.1	B. 381	12296
B. 381	36.8	B. 689	11316
B. 697	33.8	B. 505	10635
B. 505	31.3	B. 697	10405
Ba. 8069	30.5	B. 694	9846
B. 417	29.7	B. 417	9467
B. 694	29.0	B. 8069	9380

A difference between mean yields of 5.1 tons of cane or 1,559 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP III.

Centres. Mt. Wilton, Buckden, Lemon Arbor.

Standard Error of Difference between Mean Yields=1.82 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 726	42.9	B. 726	14726
B. 381	41.35	B.H. 10 (12)	14280
B.H. 10 (12)	41.05	B. 381	13370
B. 374	38.0	B. 472	12679
B. 472	36.8	B. 374	12452
B. 663	36.3	Ba. 11569	11051
B. 606	34.2	B. 663	10915
Ba. 11569	33.6	S.C. 12 (4)	10338
S.C. 12 (4)	31.65	B. 606	9888
B. 417	28.25	B. 417	8916

A difference between mean yields of 3.65 tons of cane or 1,460 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP IV.

Centres. Lion Castle, Blackmans, Vaucluse.

Standard Error of Difference between Mean Yields = 2.54 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B.H. 10 (12)	41.7	B.H. 10 (12)	14002
B. 689	37.4	B. 693	11898
B. 693	36.6	B. 381	11600
B. 381	35.4	B. 689	11045
B. 697	33.4	B. 505	10774
B. 505	31.9	B. 697	10217
B. 417	29.6	B. 694	9809
Ba. 8069	29.0	B. 417	9288
B. 694	28.9	B. 8069	8943
Ba. 11569	26.4	Ba. 11569	8905

A difference between mean yields of 5.1 tons of cane or 1,820 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

(b) BLACK SOILS.

GROUP I.

Centres. Coverley, Sunbury, Brighton, Lears, Sandy Lane, Warleigh, Newcastle.

Standard Error of Difference between Mean Yields = 1.63 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
Ba. 11569	32.6	Ba. 11569	10562
B. 663	31.9	B. 472	9479
B. 374	30.3	B. 374	9465
B. 472	29.9	B. 417	8587
B. 417	27.8	B. 663	8407
S.C. 12 (4)	26.3	S.C. 12 (4)	7779

A difference between mean yields of 3.25 tons of cane or 1,088 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP II.

Centres. Coverley, Sunbury, Brighton, Lears, Newcastle.

Standard Error of Difference between Mean Yields = 1.92 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 726	35.1	B. 726	11904
B. 374	32.7	Ba. 11569	10304
B. 663	32.6	B. 472	10142
B. 472	32.1	B. 374	10139
Ba. 11569	31.4	B. 663	8643
S.C. 12 (4)	27.3	S.C. 12 (4)	8091

A difference between mean yields of 3.85 tons of cane or 1,404 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP III.

Centres. Brighton, Lears, Newcastle.

Standard Error of Difference between Mean Yields = 2.02 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 726	39.1	B. 726	13661
B. 606	36.05	B. 374	10616
B. 663	35.0	B. 472	10594
B. 374	34.2	Ba. 11569	10201
B. 472	32.9	B. 606	10133
Ba. 11569	31.2	B. 663	9504
S.C. 12 (4)	29.8	S.C. 12 (4)	8934
B. 417	28.6	B. 417	8752

A difference between mean yields of 4.05 tons of cane or 1,264 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP IV.

Centres. Hannays, Graeme Hall, Carrington, Waterford, Ridgeway, Pickerings.

Standard Error of Difference between Mean Yields = 1.65 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 381	38.1	B. 381	12162
Ba. 11569	33.7	Ba. 11569	10869
B. 417	30.1	B. 417	9175

A difference between mean yields of 3.3 tons of cane per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP V.

Centres. Graeme Hall, Carrington, Waterford.

Standard Error of Difference between Mean Yields = 1.1 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 381	38.6	B. 381	11987
Ba. 11569	36.0	Ba. 11569	11197
B. 417	33.7	B. 417	10000
B. 693	31.0	B. 693	9577
B. 694	30.8	B. 694	9515

A difference between mean yields of 2.2 tons of cane or 572 lbs. of saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP VI.

Centres. Graeme Hall, Waterford, Ridgeway.

Standard Error of Difference between Mean Yields = 2.38 tons per acre.

Varieties	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 381	42.05	B. 381	13533
B. 689	38.3	Ba. 11569	11367
Ba. 11569	35.6	B. 689	10961
B. 417	34.1	B. 417	10418
B. 694	30.65	B. 694	9777

A difference between mean yields of 4.75 tons of cane or 1,734 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

SUMMARY OF RESULTS.

PLANT CANES.

(a) RED SOILS.

Under the climatic conditions existing during 1927, B.H. 10 (12) has proved to be the best variety, although a new variety B.726 which was grown at one group of centres gave results as good as B.H. 10 (12).

B.381, B.693, B.689, B.374 and B.472 were other varieties which gave good results, but it is probable that they are all slightly inferior to B.H. 10 (12) and B.726.

S.C. 12 (4), B.417, Ba.8069, Ba.11569, B.694, and B.606 proved markedly inferior to B.H. 10 (12) on these red soils during 1927.

(b) BLACK SOILS.

The varieties B.726 and B.381 must be regarded as the best varieties at the Black Soil centres under the climatic conditions of 1927.

Ba.11569, B.472, B.374, and B.689 were other varieties which gave good results.

B.663 and B.606 although comparing favourably with other varieties as regards yield of cane, compare unfavourably with regard to yield of saccharose.

S.C.12 (4), B.417, B.693 and B.694 have proved inferior to other varieties grown on these soils.

FIRST RATOONS.

GROUP I.

Centres. Newcastle, Lemon Arbor, Buckden, Mt. Wilton.

Standard Error of Difference between Mean Yields = 3.16 tons per acre.

Varieties.	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B.H. 10(12) ...	34·05	B.H. 10(12) ...	11984
B.663	33·7	B. 663 ...	10230
Ba.6032	31·9	B. 612 ...	10222
B.612	31·8	B. 117 ...	9861
B.603	30·25	B. 603 ...	9647
B.606	28·7	Ba. 11569 ...	9471
B.117	28·1	Ba. 6032 ...	9347
B.472	27·85	B. 472 ...	9271
Ba.11569 ...	27·2	B. 606 ...	8711
W. Trans. ...	24·1	W. Trans. ...	7862
B.417	23·5	B. 417 ...	7750

A difference between mean yields of 6.3 tons of cane or 2,200 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP II.

Centres. Newcastle, Lemon Arbor, Buckden.

Standard Error of Difference between Mean Yields = 3.31 tons per acre.

Varieties.	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B. 374	42 0	B. 374 ..	13707
B.H. 10(12) ..	33·0	B.H. 10(12) ...	11526
B. 391	30·3	B. 391 ...	10187
Ba. 6032 ...	30·05	Ba. 11569 ...	9622
S C. 12 (4) ...	28·35	S.C. 12 (4) ...	9166
Ba. 11569 ..	27·87	Ba. 6032 ...	8486
W. Trans. ...	22·16	W. Trans. ...	7126

A difference between mean yields of 6.6 tons of cane or 2,494 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

GROUP III.

Centres. Ridgeway, Vaucluse, Blackmans.

Standard Error of Difference between Mean Yields = 3.64 tons per acre.

Varieties.	Mean Yield of Cane Tons per acre.	Varieties.	Mean Yield of Saccharose lbs. per acre.
B.H. 10 (12) ..	32 0	B.H. 10(12) ...	11192
B. 465	30·6	B. 465 ...	9234
B. 368	28 7	B. 368 ...	8835
B. 381	24·3	B. 381 ...	8060
B. 585	21·95	W. Trans. ...	6877
W. Trans. ...	21·1	B. 585 ...	6610
B. 268	19·1	B. 268 ...	6414
Ba. 11569 ..	17·2	Ba. 11569 ...	5873
B. 613	16·9	B. 613 ..	4778

A difference between mean yields of 7.3 tons of cane or 2,310 lbs. saccharose per acre has a 20:1 chance of being a real varietal difference and can be regarded as significant with a fair degree of confidence.

SUMMARY OF RESULTS.

FIRST RATOONS.

In this series of trials, B.374 is probably slightly superior to B.H. 10 (12), but it cannot be said with any degree of certainty that B.H·10 (12) is any better than B.663, B.612, B.117, B.391, B.465 or B.368.

It is probable that B.H.10 (12) is better than B.603, Ba.11569, Ba.6032, B.472, B.606 and B·381.

It is almost certain that B.H.10 (12) is better than W. Trans., B.417, B.613, B.585, B.268 and B.613.

RED SOILS. PLANT CANES.

Variety.	Number of Stations.	Number of Plots.	Per cent. by number of rotten canes.	Composition of Juice.					Composition of Cane.	
				Brix.	Saccharose, lb. per gallon.	Saccharose per cent.	Glucose per cent.	Quotient of Purity.	Saccharose per cent.	Fibre per cent.
B.H. 10 (12)	8	28	4·48	21 0	2·01	18·71	·63	86·8	15·30	12·18
Ba. 8069	4	15	9·03	19·8	1·82	17·13	·77	86·5	13·88	13·16
Ba. 11569	8	27	12·92	20·9	2 00	18·94	·58	87·4	11·95	13·65
B. 2001	3	11	11·55	19·4	1 70	15·76	1·11	81·1	13·07	13·97
B. 374	4	13	3·18	20 8	1·99	18 95	·50	88·0	14·96	13·85
B. 381	8	27	6·36	20·0	1·91	17·68	59	88·2	14·99	12·91
B. 417	8	28	11·49	19 6	1 84	17·03	·66	85·5	14·21	12·26
B. 472	4	14	3·17	20·8	1·93	18·37	·65	88·4	15·41	13·53
B. 505	4	14	9 94	20·8	2 01	18·54	·41	89·0	15·14	13·81
B. 606	4	14	7·30	18·7	1·72	15·99	·71	85·4	13·18	12·04
B. 663	4	14	2·29	19·1	1·75	16·28	·88	85·2	13·51	13·84
B. 689	4	14	7·86	18·4	1·69	15·79	·78	86·0	13·15	10·28
B 693	3	11	7·79	19·7	1·86	17·23	·63	87·5	14·56	12·57
B. 694	4	15	4·76	20·6	1·96	18·12	·52	88 0	15·09	12·04
B. 697	4	15	9·84	19·1	1·74	16·18	·74	84·8	13·71	11·24
B. 726	3	12	2·28	21·1	2·06	19·03	·40	90·1	15·42	14·66
Sc. 12 (4)	4	14	6·78	20·9	1·97	18·15	·53	87·2	14·64	14·80

BLACK SOILS. PLANT CANES.

Variety.	Number of Stations.	Number of Plots.	Per cent. by number of rotten canes.	Composition of Juice.					Composition of Cane.	
				Brix.	Saccharose lb. per gallon.	Saccharose per cent.	Glucose per cent.	Quotient of Purity.	Saccharose per cent.	Fibre per cent.
Ba. 11569	13	51	13·82	20·3	1·92	17·76	·65	87·1	14·50	13·69
B. 308	4	16	1·30	19·0	1·78	16·51	·54	86·9	13·57	11·94
B. 374	7	26	4·78	20·0	1·86	17·25	·57	86·1	14·07	14·26
B. 381	11	40	4·71	19·7	1·86	17·26	·65	87·5	14·27	12·86
B 417	13	47	9·42	19·6	1·83	16·95	·58	86·5	13·78	13·22
B. 465	3	12	9·38	20·5	1·91	17·97	·44	87·4	14·59	13·05
B. 472	9	35	4·74	19·8	1·85	17·14	·49	86·5	13·75	14·26
B. 606	4	15	7·94	18·1	1·30	14·96	·89	82·6	12·55	13·06
B. 663	7	25	5·86	17·6	1·53	14·31	·93	81·7	11·78	14·13
B. 693	3	10	2·61	19·3	1·80	16·73	·59	86·7	13·86	12·02
B. 694	5	20	3·70	19·7	1·87	17·38	·46	88·0	14·20	13·24
B. 697	6	24	4·75	18·5	1·70	15·86	·81	85·8	13·24	12·07
B. 726	5	18	2·77	21·3	2·01	18·57	·41	87·3	15·07	15·01
B. 759	3	11	2·74	20·0	1·88	17·39	·44	86·8	14·59	11·96
S.C. 12 (4)	7	26	8·20	19·6	1·82	16·92	·43	87·2	13·38	15·25

FIRST RATOONS.

Variety.	No. of Stations.	No. of Plots.	Per cent. by number of rotten canes.	Composition of Juice.					Composition of Cane.	
				Brix.	Saccharose lb. per gallon.	Saccharose per cent.	Glucose per cent.	Quotient of Purity.	Saccharose per cent.	Fibre per cent.
W Trans.	7	23	8·39	20·6	1·91	17·65	·66	85·5	14·42	12·74
B. H. 10(12)	7	23	2·53	22·5	2·14	19 64	·62	87·2	15·61	14·56
Ba. 6032	6	19	1·17	19·1	1·74	16·13	·77	84·2	13·14	13·21
Ba. 11569	7	23	21 82	21·5	2·03	18·73	·66	87·1	15·14	13·70
B. 117	4	13	5·14	22·3	2·14	19·63	·37	88·1	15·73	14·10
B. 268	3	10	33·35	20·3	1·86	17·21	·81	84·5	14·70	12·74
B. 368	2	7	2·89	20·0	1·80	16·68	·87	83·3	13·55	13·38
B. 374	3	9	1·00	21·5	2·01	18·52	·42	86·3	14·58	14·48
B. 381	3	10	24·18	20·7	1·92	17·71	·70	85·6	14·69	13·41
B. 391	3	9	3·22	21·5	2 01	18·79	·44	87·5	15·05	13·87
B. 417	7	23	5·51	21·0	1·98	18 29	·49	87·1	14·83	14·07
B 465	3	10	13·22	20·2	1·78	16·51	1·14	81·8	13·31	14·71
B. 472	4	13	2·64	21·1	2·01	18·51	·36	87·5	14·78	14·47
B. 585	3	10	3·81	19·6	1·78	16·55	·75	84·3	13·41	14·66
B. 603	4	13	1·85	20 5	1·89	17·52	·55	85·3	14·17	13·35
B. 606	4	13	3·94	19 7	1·81	16·77	·68	84·9	13·50	13·25
B. 612	4	13	·52	20·2	1·90	17·59	·37	86 8	14·35	14·56
B. 613	3	10	30·46	18 8	1·63	15·18	1·44	80 6	12·72	12·03
B. 663	4	13	1·44	19·6	1·77	16·41	·75	83·9	13·54	13·47
S.C. 12 (4)	3	9	1·76	20·8	1·98	18·29	·27	87·9	14·43	14·11

THE VARIETY B.726 AS A POSSIBLE COMMERCIAL VARIETY.

The results obtained from the variety tests at the Select Seedling Stations indicate that the variety B·726 is equally as good as the standard variety B.H.10 (12), and that in the black soil districts where B.H.10 (12) is seldom grown, B.726 has proved to be the best variety.

It was only possible to arrive at this conclusion at a late stage in the reaping season. However, all available plants were secured at that stage and planted in order to make it possible to organize a general distribution of this variety to planters at the next planting season.

An account of the work of the Agricultural Chemist is included in the Government Laboratory Report which follows. Reference is made in the section dealing with the Scientific Control of Pan Boiling to the installation of a Zeiss industrial refractometer in one of the vacuum pans at Sandy Lane Factory.

The Department is extremely grateful to the management of Sandy Lane Factory for permitting the installation of the refractometer and the performance of experimental work at the factory. For the latter purpose a room was added to the factory at the expense of the management of the factory. The Department also greatly appreciates the personal assistance given by Mr. E. E. H. Thorne and Mr. S. C. Thorne to the Agricultural Chemist in facilitating the performance of his work.

REPORT FROM GOVERNMENT LABORATORY.

A. Investigational Work.

The results of the research work which has been undertaken during the past year have been summarized under two heads.

(1) Sugar Technology.

Two problems have been investigated:—(a) The Clarification of Cane Juice, (b) The Scientific Control of Pan boiling.

(a) *The Clarification of Cane Juice.*

In the customary method of defecation lime is added to the juice and, with the aid of heat, albumin and phosphates are precipitated as a flocculent mud. These precipitates entrain suspended matter and also adsorb part of the colloidal impurities in the juice. Phosphoric Acid, hydrous aluminium silicate and various other substances have been suggested and used at various times for increasing the volume and hence the adsorbing properties of the precipitate. The cost of using such materials on the commercial scale often negatives their value.

Clay contains a large proportion of colloidal alumina and silica and, under the correct conditions, gives a flocculent precipitate with lime. Clay has the advantage of cheapness. Experiments have been carried out, using a pottery clay from the Scotland district to find (a) the optimum conditions for precipitation of clay in cane juice and (b) whether the normal method of clarification could be improved by such precipitation of clay.

The optimum conditions for precipitation in the juices used were:

1. Addition of sufficient lime to give a clarified juice of pH 8.3 to 8.4.
2. Addition of about 0.25 per cent. clay. With certain juices it was found that a small amount of clay remained in suspension and gave a somewhat turbid appearance to the juice. The subsequent passage of such juice through a Sharples Super Centrifuge gave a brilliantly clear product.

A comparison between ordinary and clay defecation was made on the basis of purity determinations which although an unsatisfactory method was the only method of comparison available at the time in the laboratory. The lime defecation was carried out at pH 8.3 to 8.4 as it was found that the purity of the clarified juice increased with increasing pH. The lime and clay defecations were therefore compared at similar reaction values.

As a result of 18 comparisons with different juices, the clay defecation showed an average increase of 0.4 in purity over the lime defecation. This increase in

purity is probably significant. It is probable that in juice with a lower phosphoric acid content a greater effect would be obtained. Under practical conditions it seems probable that in Barbados where juices are relatively high in phosphoric acid the introduction of lime salts may offset the advantages gained by increased precipitation with clay. This disadvantage of high liming has been pointed out by Paine *et al* in recent work in Porto Rico. In such places as Hawaii, however, where the juice appears to be different from that obtaining in the West Indies and where the Experiment Station advises liming to between pH 8.0 and 8.3, the application of clay defecation may prove of value.

(b) *The Scientific Control of Pan Boiling.*

A Zeiss industrial refractometer which had been purchased by the Department was installed in one of the vacuum pans at Sandy Lane Factory. The application of the refractometer to the control of the boiling process has been worked out and applied with very satisfactory results. During the crop season sufficient data were obtained to correlate purity of massecuite with purity of mother liquor under optimum boiling conditions. With the aid of these data, Claasen's formula and certain other data determined by Thieme in Java, the application of the refractometer to practice is a simple matter. With the aid of tables which have been prepared, the pan can be boiled without reference to the proof stick or sight glasses by any intelligent person.

2. The Ash Analysis of Sugar Cane Juice and its Relation to Yield.

Determinations have been made of the ash, phosphoric acid and potash in the juice obtained from certain varieties of cane grown on the varietal experiment plots at the different centres scattered over the Island. From this investigation the following observations which will not be discussed in this report can be made.

(a) *Differences due to Variety (irrespective of soil).*

1. Under the climatic conditions of 1927, B. 417 gave significantly lower yields per acre than either B. 381 or Ba. 11569.
2. The juice of B. 417 has a significantly greater ash content than the juice of either B. 381 or Ba. 11569.
3. The percentage of phosphoric acid in the ash of B. 381 and Ba. 11569 is significantly greater than the percentage of phosphoric acid in the ash of B. 417.
4. The percentage of potash in the juice of B. 417 is significantly greater than the percentage of potash in the juice of B. 381 and Ba. 11569.

(b) *Differences due to Soils (irrespective of Variety).*

1. A positive correlation which is significant exists between the percentage of potash in the ash of the juice and the yield.
2. A negative correlation which is significant exists between the percentage of phosphoric acid in the ash of the juice and the yield.
3. Similar correlations exist between the percentage of potash in the juice and the yield and the percentage of phosphoric acid in the juice and the yield, but these correlations are probably not significant.
4. Negative correlations exist between the percentage of potash in the juice and the percentage of phosphoric acid in the juice and between the percentage of potash in the ash of the juice and the percentage of phosphoric acid in the ash of the juice.

It seems probable that only the first of these correlations is significant.

5. There is a positive correlation between the percentage of ash in the juice and the yield, but this correlation is almost certainly not significant.
6. 28 out of 29 centres gave cane juices which contained more than 0.02 per. cent. of phosphoric acid. This figure was found by Walker in Hawaii to be the limit below which the cane would respond to phosphoric acid manuring. It is probable that a lower figure than this will prove to be applicable to Barbados soils.
7. 23 out of the 29 centres gave cane juices which contained more than 0.03 per cent. of phosphoric acid. McAllep and Bomonti have shown in Hawaii that

efficient clarification is obtained if the juice contains more than 0.03 per cent. of phosphoric acid.

8. 27 out of the 29 centres gave juices which contained more than 0.05 per cent of potash. This figure was given by Walker in Hawaii as the limit below which the cane would respond to potash manuring.

9. The juices examined are therefore, on the whole, high both in phosphoric acid and potash. This would indicate that most of the soils on which the experimental plots are situated are well supplied with these ingredients.

B. General Analytical Work.

The total number of samples analysed this year was 944 and may be classified as follows:—

Official

(1)	*Police Department*	
	Viscera and examinations for suspected poisons	13
	Coins and counterfeiting material	20
	Milks	331
(2)	*Customs Department*	
	Condensed Milks	34
	Spirituous liquors	2
	Petroleum oils	159
(3)	*Department of Science & Agriculture*	
	Manures	5
	Waters	12
	Miscellaneous	32
(4)	*Waterworks Department*	
	Waters	12
	Fuel oil	4
(5)	*Analytical Committee*	
	Manures	39
	Feeding stuffs	17
(6)	*Parochial*	
	Salted meat and fish and other foodstuffs	25

Unofficial.

Manures	38
Feeding stuffs	4
Cane juices	90
Miscellaneous	97

Police Department Samples.

Strychnine was discovered and estimated in five samples of human viscera.

Arsenic derived from Paris Green was found in large quantity in the viscera of a cow and on some fodder supplied to it.

Five grains of White Arsenic were separated from two discoloured patches of a suspected pumpkin.

Thirty-seven grains White Arsenic were found in a quantity of oats and corn.

Twelve coins were submitted and all found to be counterfeit. Eight exhibits in connexion with counterfeiting were examined and reported on—exhibits consisting of alloys, mould materials, plating solutions, etc.

Three hundred and thirty-one samples of milk were submitted and examined. This represents an increase of 241 on the 1926 samples. The percentage of adulterated samples was 19, an increase on 1926 when the percentage was 17.7.

Customs Department Samples.

Thirty-four samples of evaporated, condensed and dessicated milks, representing twenty-four different brands, were examined. Six samples failed to meet the standard of English regulations.

All samples of Petroleum oil submitted under the Petroleum Act and examined for Flash point, were well within the limits of the Act.

Department of Science & Agriculture Samples.

Analyses of Farmyard manure and cyanamide, used in connexion with Manurial experiments, were made. Analyses of waters were performed in connexion with the rainfall at Codrington Meteorological Station. The miscellaneous items under this head include Laboratory experiments on pasteurised and iced milks, on the Centrifugal method of fat estimation and on Glucose determinations in Cane Juices with Fehling's solution, using Methylene blue as an internal indicator; preparation of pure Sulphur dioxide solutions for cane arrow lantern work; determinations of the Calorific value of the local coal Gas—Boy's Gas Calorimeter improved type as prescribed by the Gas Referees 1926, was used. The composition, pressure, etc., of the gas were also ascertained. Results indicated a substantial improvement in the quality of the gas supplied this year, as compared with that supplied in 1926.

The calorific value of Fuel oil—supplied to Waterworks pumping station—was determined. The Berthelot-Mahler-Kroeker's Bomb Calorimeter was used.

Examinations of Insecticides and Fungicides were made.

Ammonia determinations in potable waters by a new form of apparatus were tried out.

Waterworks Department.

The quarterly analyses of the water supplied by the department through its mains were carried out. The usual high quality was uniformly maintained. Examination of several cloudy samples, submitted during periods of abnormally high rainfall, indicated that the turbidity had but slight effect on the purity of the water.

Analytical Committee Samples.

The Committee submitted samples of the various fertilizers on the local market, including the recent Cyanamides. It is to be noted that the majority of Fish manures submitted were found to contain the bulk of the Potash as muriate instead of sulphate as formerly.

Samples of the various feeding stuffs were also submitted—a uniform good quality was maintained.

Parochial Samples.

Seventeen samples of pickled meat, salted fish, etc., submitted by Sanitary Commissioners, were examined. Nine of these were found unfit for human food. An examination of six samples of canned and pickled material for likely preservatives showed none of the samples submitted contained these preservatives.

Examination and report were made on the locally made "E. C." disinfectant.

The Arsenic content of a sample of Calcium arsenate, used as an insecticide, was determined.

Unofficial Samples.

The Manures under this head are samples submitted by the local trading firms and include natural organic manures, synthetic fertilizers, etc., etc.

Cane juices from various plantations and factories were sent for analysis.

The miscellaneous samples include chiefly: Condensed Milks, waters for drinking and domestic purposes and for water softeners, hydrometers for corrections to their calibration, fuel oils, cements, limes, etc., etc.

C. Analytical Work in Connexion with Sugar Cane Variety Trials.

The milling and analytical operations in connexion with the Seedling cane experiments were conducted in the newly erected machinery building. In this building have been housed:—

(1) The new electrically driven Cane Mill—a three roll 18″ x 12″ unit.
(2) Oil-engine driven Cane Mill, a similar unit to above.
(3) Megass cutters and Wiley Laboratory Mill.
(4) Crowell's Rotary Air Pump for operating a Sharples Supercentrifuge, and supplying vacuum for various operations.
(5) A Freas Electric Vacuum Oven.
(6) Laboratory working benches, polariscopes and other sugar house laboratory equipment.

The Electric Cane Mill is operated by a new 15 H.P. motor which was obtained to replace the 8 H.P. motor that was originally supplied but which could not be used for the 1927 crop because underpowered.

The old Oil engine mill had to be seconded for duty on one occasion but fortunately, the electric mill was soon in operation again. Preliminary gas heating of the compression chamber has been substituted for the sooty oil blowpipe lamp.

A 5 H.P. Electric motor was installed to drive the miscellaneous apparatus in the building, viz., Crowell's Pump, Wiley Laboratory Mill, Cane disintegrator, Small two roll Cane Mill, Cotton gin.

The laboratory benches have been equipped with gas, water, electricity, as well as all the other apparatus of a complete sugar laboratory.

Milling operations started on 14th February and ended on 8th June.

1190 samples of Cane juice and 358 samples of Megass were analysed.

The Megass analyses were greatly facilitated by

(1) *Wiley Laboratory Mill.* By the use of this mill sampling of the megass was performed most expeditiously, without loss of moisture, and the sample is of a character which renders subsequent analysis very much less tedious. Experiments have shown that with the use of the Wiley Mill errors due to sampling can be reduced to a minimum.
(2) *Freas Electric Oven.* With vacuum, and a current of hot dry air, this oven permits of very rapid drying. In the routine analyses of megass it was possible to reduce the time of drying from the usual 4 — 5 hours to about 1½ hours. In addition the automatic temperature control permitted the drying under optimum and very uniform conditions.
(3) *The Crowell's Rotary Air Pump.* This pump was put into operation and so arranged that the apparatus could function either as a compressor or as a Vacuum pump as required. It was connected up with the Sharples Supercentrifuge which, at 22 lbs. per square inch, it operated at thirty thousand revolutions per minute. At this high speed the supercentrifuge was found very useful in separating finely dispersed matter from cane juices, syrups, etc., which it is very difficult to separate otherwise.

D. Visit to the Imperial College of Tropical Agriculture.

In October 1927 I vsited the Imperial College of Tropical Agriculture in Trinidad. Through the kindness of Colonel Evans and Professor Hardy I was able to make myself thoroughly acquainted with the investigations which are being undertaken in Chemistry and Sugar Technology at the College.

Professor Hardy and his colleagues are primarily engaged in an investigation of the Froghopper blight of sugar cane. By a systematic study of the cane soils they have shown that where Froghopper blight is evident the soils are acid, whereas canes growing on adjacent alkaline soils are rarely, if ever, blighted.

In Barbados all of the soils on the coral limetsone formation that I have examined are alkaline in reaction, so that we can predict fairly confidently that canes grown on the majority of soils in Barbados are never likely to be severely blighted with Froghopper.

I was able to inspect the Experimental Factory which is fitted up, in such a way, that various types of sugar can be manufactured. In the laboratory of the sugar technology department a study is being made of the methods for estimating pentosans and pectins in juices, and the application of such determinations as surface tension, viscosity and electrical conductivity to the control of sugar manufacture are also being tried out.

I would like to say how very valuable I think such visits, as the one described, are in establishing personal contacts, in permitting an exchange of opinions between workers of similar problems and in preventing overlapping of work.

S. J. SAINT,
Agricultural Chemist.

COTTON EXPERIMENTS.

GENERAL.

Owing to absence of a Geneticist on the Staff, the work with cotton was mainly confined to the preservation of the strain of Sea Island cotton which had hitherto been produced.

The following notes may be of interest.

Sea Island Cotton.

The seed for planting was selected on the Progeny Row System. From the twenty sets of Progeny Rows planted last season the two which gave the heaviest yields with best quality lint were selected for furnishing seed for future plantings; these were numbered S (27) 6 and S (27) 8.

Native Cotton.

Four plants were selected from the fifteen which were grown in the cotton house at Codrington and the seed from them planted in separate plots for the preservation of the strain.

American Long Staple Upland.

Owing to the poor demand for Sea Island cotton and on the advice of Mr. H. C. Sampson, C.I.E., Economic Botanist of Kew, it was decided to introduce strains of long staple American Upland, a type of cotton for which there is a consistent demand. Seed of eight different strains was accordingly imported from America.

The performances of these plants will be closely studied and compared with the existing Sea Island types with a view to comparing their respective suitabilities for the Island.

METEOROLOGY.

The following are summaries of the observations recorded at the Government Meteorological Station for the year 1927, the details of which are given in Appendix I.

Barometric Pressure. During 1927 the mean pressure corrected for temperature and gravity and reduced to sea-level was at 9 a.m. 29.963 and at 3 p.m. 29.888, the highest recorded being 30.087 at 9 a.m. on February 15 and the lowest 29.708 at 3 p.m. on December 1st. For the ten years 1917-26 the average barometric pressure was at 9 a.m. 29.977 and at 3 p.m. 29.903. The highest pressure during the ten years was at 9 a.m. on January 22, 1925, when it was 30.127 and the lowest at 3 p.m. on September 8, 1921, when it was 29.694.

Temperature. The mean maximum temperature for the year 1927 was 85.5° F and the mean minimum 72.8° F. The maximum extreme for the year which was 91.5° F was registered on August 23 and the minimum extreme which was 66.0° F was registered on March 11 and December 30. The mean average temperature was 79.2° F; the highest monthly range 20.9° F, and the lowest 16.2° F the mean monthly range being 18.1° F.

Tension of Vapour and Relative Humidity. The mean tension of vapour for 1927 was at 8 a.m. .756 and at 5 p.m. .732. The mean relative humidity was at 8 a.m. 73.6% and at 5 p.m. 71.0%.

Wind. The mean daily velocity of the wind during 1927 was 7.6 miles per hour, the maximum being 16.3 miles per hour on June 8 and the minimum 2.1 miles per hour on September 24. The average daily velocity for the ten years ended 1926 was 11.4 miles per hour.

Rainfall. The rainfall measured at the Government Meteorological Station during 1927 amounted to 59.03 inches. This fell on 227 days, the greatest fall being 3.69 inches on October 15. For the ten years 1917-26 the average rainfall was 42.28 inches and the average number of days on which rain fell was 169.

Rainfall of the Island. The total mean rainfall for the year 1927 from 151 stations was 64.02 inches which fell on 155 days and was 3.40 inches above the average for the sixty years ended December 31, 1926, which was 60.62 inches. A summary of the total mean rainfall for the Island is given in Appendix II.

BARBADOS RAINFALL.

CHART COMPARING AVERAGE FOR TEN YEARS 1917—26 WITH RAINFALL FOR YEAR 1927.

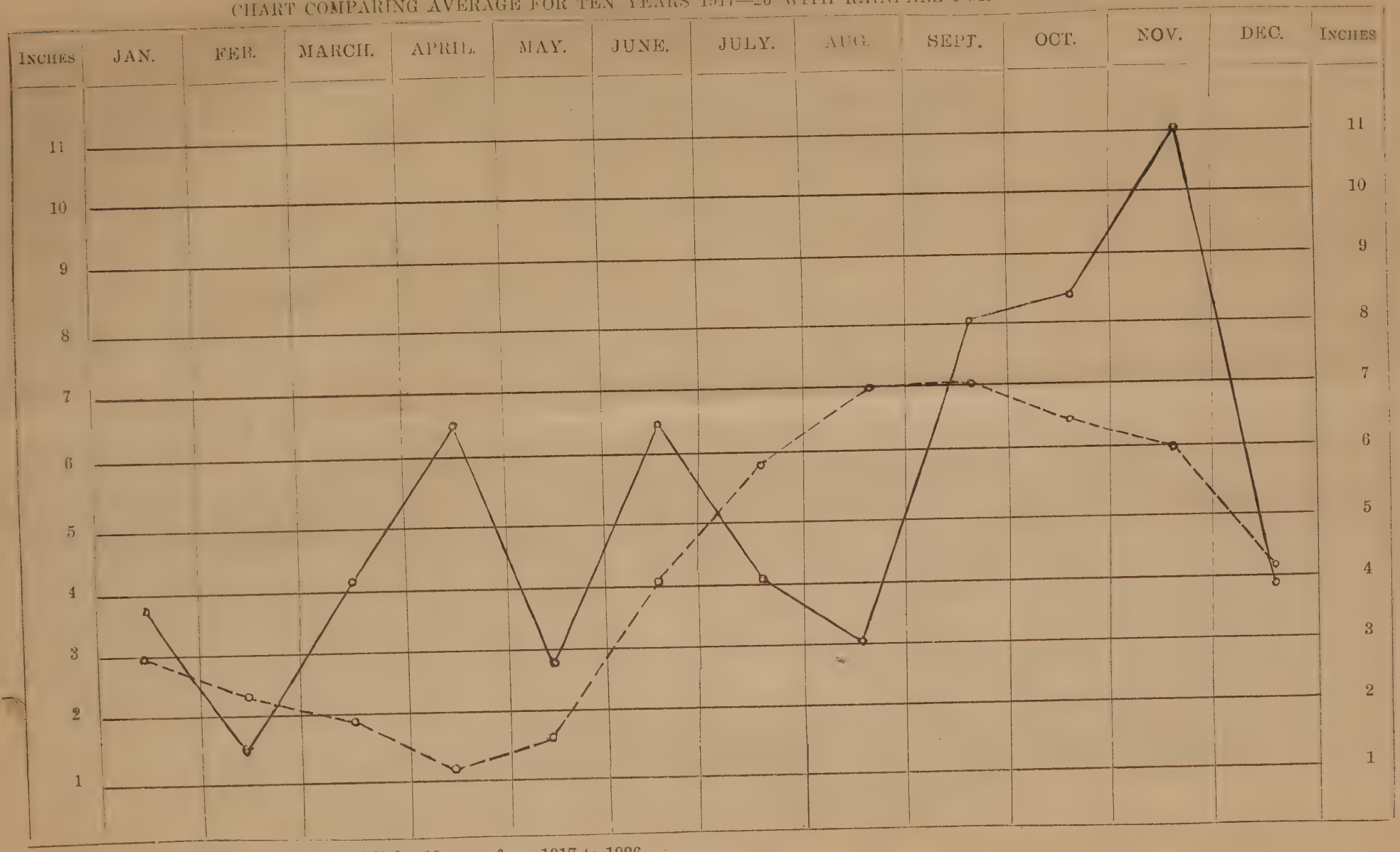
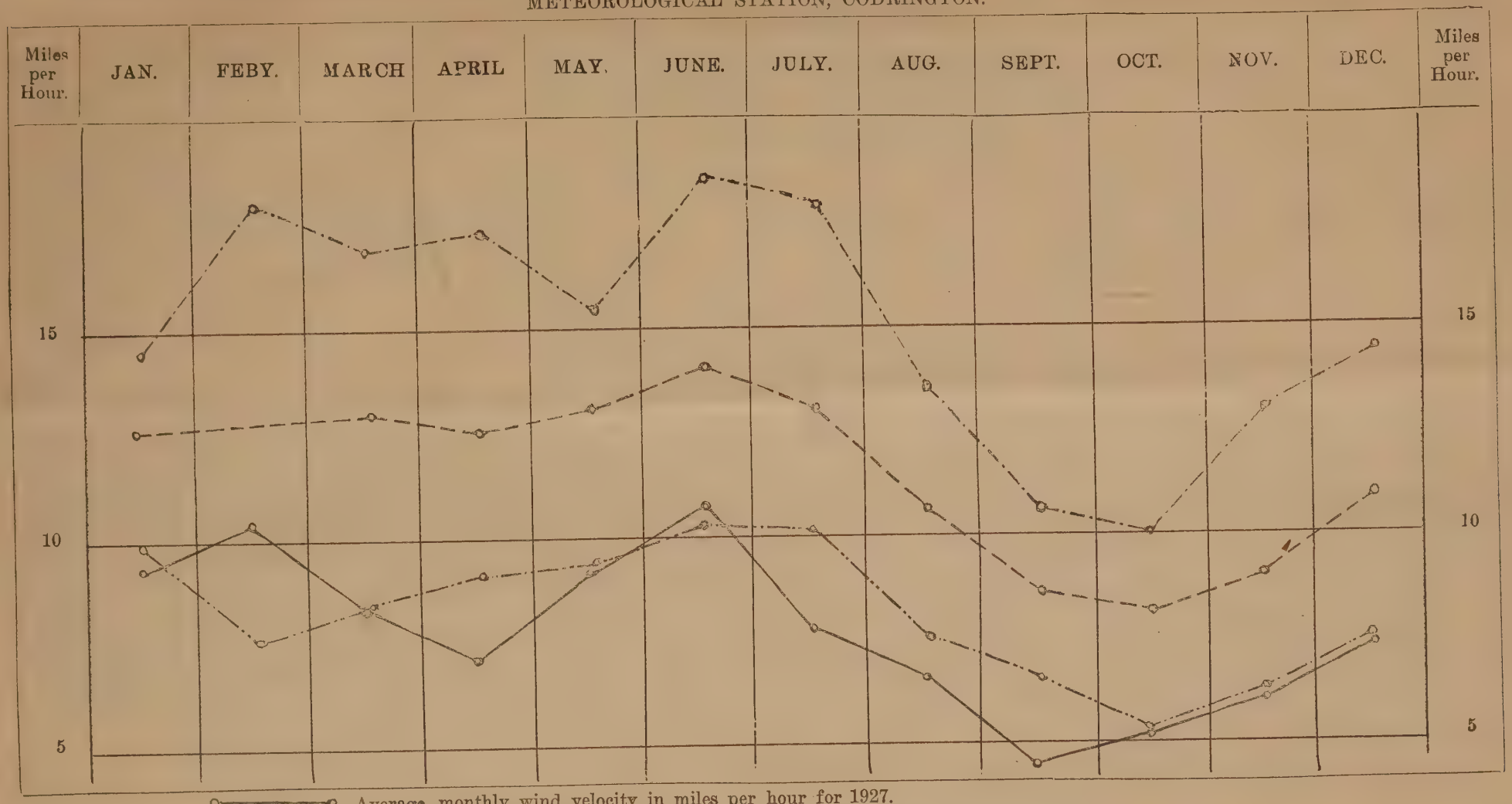


CHART SHOWING COMPARISON OF WIND VELOCITIES DURING THE PERIOD OF YEARS 1903—1926 WITH THE YEAR 1927 AT THE METEOROLOGICAL STATION, CODRINGTON.



Average monthly wind velocity in miles per hour for 1927.
Maximum " " " " " " " during the period 1903—26
Minimum " " " " " " " " " " " "
Average " " " " " " " " " " " "

APPENDIX I.

METEOROLOGICAL REPORT FOR 1927.

DEPARTMENT OF AGRICULTURE, BARBADOS.

HEIGHT ABOVE SEA-LEVEL 181 FEET.

Months.	Barometric Pressure reduced to 32° Fahrenheit, Lat. 13° 7′ N., Mean Sea-level, and corrected for gravity.					Temperatures ° F.									Tension of Vapour.			Relative Humidity.			Wind, Velocity miles per hour.	Rainfall.	No. of days on which rain fell.
	9 a.m.	3 p.m.	Mean.	Highest.	Lowest.	Maximum Mean.	Minimum Mean.	Maximum Extreme.	Minimum Extreme.	Maximum blackened bulb 4 feet from ground in vacuo.	Mean for month.	Range for month.	Dew Point 8 a.m.	Dew Point 5 p.m.	8 a.m.	5 p.m.	Mean.	8 a.m.	5 p.m.	Mean.			
January ...	29·986	29·903	29·944	30·043	29·851	82 9	70·6	85·5	67·5	146·5	76·8	18·0	68·3	67·4	·694	·673	·684	75·6	69·9	72·8	9·1	3·93	19
February ..	30·018	29·939	29 978	30·087	29·873	82 9	71·3	85·5	68·0	144·5	77·1	17·5	66·8	65·6	·669	·632	·646	70·8	64·8	67·8	10·3	1·29	16
March ...	30 009	29 932	29·970	30·048	20·854	84·9	71·3	86·6	66·0	150 7	78·1	20·6	69·1	67·3	·716	·670	·693	73·0	67·0	70·0	8 2	3·79	20
April ...	29·946	29·872	29 909	30·015	29·778	84·9	72·5	87·2	71·0	150·0	78·7	16·2	70 2	69·3	·744	·722	·733	74·4	72·6	73·5	7·0	4·91	22
May ..	29·993	29·921	29·957	30·041	29·863	86·3	73·5	88·2	70·0	147·1	79·9	18 2	69·9	69·3	·733	·720	·727	69·7	68·0	68 9	9·0	2·39	16
June ...	29·997	29 931	29·964	30 054	29·888	85·4	74 5	88·2	72·0	148·3	80·0	16·2	71·0	71·4	·761	·771	·766	73·2	74·3	73·8	10·7	7·92	25
July ..	30·016	29 954	29·985	30·071	29·877	86·6	73·5	88 0	71·4	144 9	80·1	16 6	72·1	71·2	791	·763	·777	73·4	71·4	72·4	7·5	2 88	17
August ...	29·956	29·894	29 925	30·030	29·838	88·4	73·9	91·5	70·6	150·4	81·2	20·9	72·3	71·2	·793	·769	·781	70·4	68 3	69·3	6·4	3·50	13
September ...	29·917	29·841	29 879	29·971	29·790	87 2	73·3	89·0	71·4	149·3	80·3	17·6	72·9	71·4	·811	·771	·791	73·7	71·3	72 5	4·6	5.00	18
October ..	29·907	29·823	29·865	29·972	29·737	86·7	73·9	88·6	71·0	151·6	80·3	17 6	73·4	71·8	·826	·783	·805	76·4	73·4	74·9	5·2	8·91	20
November ..	29·892	29 803	29·848	29 984	29·724	85·6	73·1	87·8	70 2	149·6	79·3	17 6	73·0	71·9	·814	·785	·798	77·4	77·5	77·4	6·0	9·99	19
December ...	29 923	29·842	29·883	30·011	29 708	84·1	72·7	86·4	66·0	148·1	78·4	20·4	69 8	69·4	·725	·722	·723	75·1	73·6	74·3	7·4	4·49	22
	359·560	358·655	359·107	360·327	357·781	1025·9	874·1	1052·5	835·1	1781 0	959·2	217·4	848·8	837·2	9·068	8·781	8·924	883·1	852·1	867·6	91·4	59·03	227
	29·963	29·888	29 926	30·027	29·815	85·5	72·8	87·7	69·6	148·4	79·2	18·1	70·7	69 8	·756	·732	·741	73·6	71 0	72·3	7·6	4 92	...

SUMMARY OF BARBADOS RAINFALL FROM

Name of Station.	Elevation.	January.		February.		March.		April.		May.		June.	
	Feet.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days	Inches.
DISTRICT "A"													
ST. MICHAEL													
Lowlands. ..	18	16	3·51	8	1·10	13	2 81	15	5·12	10	2·12	20	8·35
DISTRICT "B"													
CHRIST CHURCH													
Lowlands. ...	14	15	3·22	7	1·41	12	2·86	15	5·19	10	1·91	19	9·41
ST. GEORGE.													
Highlands. ..	8	17	4·49	9	1·55	14	4·80	15	4·84	11	3·24	18	8·11
Lowlands. ...	10	17	4·47	9	1·73	12	3·23	16	5 15	10	2·21	19	7·94
DISTRICT "C"													
ST. PHILIP.													
Highlands ...	2	17	3·70	7	1·16	12	4·54	14	5·22	11	2·34	21	6·20
Lowlands. ...	18	15	3·49	6	1·19	13	4·46	14	5·29	9	2·02	19	6·49
ST. JOHN.													
Highlands ...	13	15	3·33	8	1·32	14	4·74	16	4·32	12	3·21	18	6·98
Lowlands. ...	3	10	1·67	8	·97	9	4·36	13	5·28	8	2·12	14	5·01
DISTRICT "D"													
ST. THOMAS.													
Highlands ..	11	19	4·86	10	1·52	16	5·06	18	6·71	13	3·53	19	6·99
Lowlands ...	7	17	4·17	9	1·70	14	4·09	16	5·76	11	2·68	16	7·24
ST. JAMES													
Highlands ...	1	18	4·87	8	1·35	15	6·09	19	8·14	8	2·49	12	5·60
Lowlands. ...	8	19	3·71	11	1·16	13	2·64	17	6·10	10	2·28	19	6·77
DISTRICT "E"													
ST. PETER.													
Highlands ...	8	14	3·57	9	1·93	15	4·37	17	10·39	8	2·85	18	5·84
Lowlands ...	5	16	3·55	9	1·67	13	3·58	16	10·33	8	2·27	20	5·85
ST. LUCY.													
Lowlands. ...	10	11	2·40	6	1·49	12	2·96	13	9·21	7	3·02	15	5·81
DISTRICT "F"													
ST. JOSEPH.													
Highlands ..	8	20	4·55	9	1·70	14	5·69	18	6·32	13	3·42	18	6·19
Lowlands ...	2	10	3·30	4	·50	9	4·93	10	4·17	6	2·64	15	4·36
ST. ANDREW													
Highlands ...	3	15	3·78	7	1·53	11	3·40	15	8·56	6	3·69	16	6·30
Lowlands. ...	2	11	3·57	6	1·38	9	2·34	14	6·47	6	5·00	15	4·16
	151	292	70·21	150	26·36	240	76·95	291	122·67	177	53·04	331	123 60
		16	3.69	8	1·39	13	4·05	15	6·46	9	2·79	17	6·50

DIX II.

JANUARY TO DECEMBER, 1927.

July.		August.		September.		October.		November.		December.		Totals.	
Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
13	3·15	12	3·25	13	4·65	14	7·48	14	9·93	13	4·07	161	55·54
14	3·58	10	2·65	15	6·38	15	7·55	16	9·71	13	3 95	161	57·82
13	4·25	12	4·28	15	10·78	16	8·52	15	11·44	14	5·21	169	71·51
14	3·38	12	2·62	14	6·14	15	7·88	17	10·16	15	5 20	170	60·11
15	3·81	12	3 51	16	5·18	18	7 42	15	10.43	13	4·77	171	58·28
14	3·91	12	3 14	15	5·23	17	7·46	16	10·44	13	3·98	163	57·26
14	4·75	12	3.71	16	11 97	17	9·32	15	11·70	11	4·45	168	69·80
11	3·49	9	2.30	14	5·49	16	11·30	13	9·75	8	3·16	133	54·90
14	6·19	14	3·92	18	12.84	16	8·58	17	13·49	14	4·93	188	78·62
12	5·01	13	4·90	15	13·56	14	7·82	13	11.80	13	5 46	163	74·19
6	4·03	7	1·93	14	8 36	13	10·47	15	10·89	10	3·84	145	68·11
12	4·90	11	4 09	15	6·84	14	8·01	17	10·02	11	3·25	169	59·77
12	3.54	11	2·88	17	8·99	17	9·95	17	11.99	11	3·67	166	69·97
14	3.16	12	2·22	16	7·79	15	9·50	18	8·52	11	2·99	168	61·43
10	2·57	10	2·06	15	7·28	13	8·20	15	9·35	9	3·15	136	57·50
11	6 34	14	3·84	18	10·09	17	8·69	16	13·18	14	5·28	182	75·29
10	6·14	9	3·07	14	10·55	15	10·02	13	12·88	9	4·66	124	67·22
10	2·72	10	2.14	15	6·86	15	9·33	16	13·04	11	2·80	147	64·15
10	2 52	9	1·81	14	6·56	15	5 87	13	13·09	9	2·15	131	54·92
229	77·49	211	58·32	289	155·54	292	163 37	291	211·81	222	76·97	3015	1216·33
12	4.08	11	3 07	15	8·19	16	8·60	15	11·15	12	4·05	159	64·02

RAINFALL AT SELECT SEEDLING STATIONS

Stations.	Height above Sea-level. ft.	December 1926.		January 1927.		February		March		April		May		June		July	
		Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
Dodds ...	210	6	1·83	17	3·12	7	1·05	15	4·72	16	6·32	11	1·76	20	5·36	13	3·63
Graeme Hall	...	11	2·33	11	2·39	7	1·64	14	2·16	13	5·41	8	1·82	19	9·09	14	3·89
Coverley ...	254	12	2·27	20	3·22	8	1·08	12	2·90	14	6·49	14	2 25	23	9·69	21	3·20
Carrington	110	14	2·72	16	4 16	12	1·82	17	4·15	15	4·23	9	1·43	22	6·58	17	3·85
Sunbury ..	...	12	2·62	19	3·86	6	1·34	16	4·68	12	6·20	9	1·87	20	5·87	18	4·68
Brighton ...	271	6	3·18	13	4·71	7	1·40	11	3·25	15	4·66	11	2·12	15	6·90	11	3·58
Waterford ...	186	7	2·01	19	3·47	9	·76	13	2·93	16	4·05	11	2·10	20	7·93	9	2·26
Warleigh ...	...	9	2·96	15	4·51	6	1·48	10	3 54	17	14·20	8	2·13	20	6·44	10	3·48
Pickerings ...	71	9	2·49	13	2·80	7	2·10	14	2·91	15	9·49	7	2·81	17	6·63	7	2 89
Sandy Lane	...	10	1·80	18	3·00	14	1·26	11	2·06	17	4·78	13	2·20	18	5 92	12	5·04
Hannays ...	...	8	3·56	12	3·71	5	1·84	11	3·27	14	5·00	11	2·31	17	8 96	11	3 31
Ridgeway ..	...	13	3·40	18	4·21	10	1·52	19	3 97	15	7·03	7	3·31	15	8 06	10	5·59
Newcastle ..	...	12	2·70	17	2·21	9	·63	14	3 51	17	5·42	12	2·50	18	4·20	17	3·79
Lears ...	...	7	2·77	14	5·09	8	1·88	18	4·38	20	5·63	14	3 56	18	7·28	16	4·42
Lemon Arbor	720	11	4·68	13	3·67	9	1·51	12	5·42	12	4·23	9	3·39	15	7·72	11	5·50
Clifton Hall	792	9	3·32	13	3·54	4	·77	9	4·51	12	5·56	10	3·82	17	5·26	11	4·61
Vaucluse ...	731	14	4·58	21	4·37	12	2·26	18	4·31	18	6 92	15	3·01	20	8·22	14	6·32
Springhead	...	...	...	...	...	...	...	—	—	...	...	—	...	...	..	...	—
Blackmans...	...	14	6·20	20	4·79	9	1·82	16	5·09	18	5·91	13	4·20	20	7·11	14	6·07
Buckden ...	...	...	—	21	4 31	11	1·52	13	4·91	16	6·16	11	3·05	15	5·71	7	6 90
Lion Castle	...	17	5·82	24	5·19	17	1·16	22	5·04	22	6·74	18	4·88	22	7·88	17	6·90
Mount Wilton...	...	13	4·08	19	4·58	11	1·34	22	5·07	22	5·85	14	3·51	20	5·68	16	6·33
Baxters ...	—	—	...	—	...	...	...	...	...	...	—	...	...	—	—	...	...

DIX III.

FROM DECEMBER 1926 TO MARCH 1928.

August		September		October		November		December		January 1928.		February		March		Total.	
Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
14	2·60	15	3·75	19	6.12	16	8·86	15	3·74	19	2·69	15	1·45	15	1·61	233	58·61
9	2·63	11	4·21	12	6·18	14	6·51	10	3·92	15	2·80	10	1·17	7	1·81	185	57·96
13	2·75	18	6·64	18	9·60	17	11·11	12	4·23	...	...	...	...	...	...	...	...
11	3·69	20	7·86	17	5·79	18	13·17	16	4·42	19	3·50	14	1·51	14	2·22	251	71·10
12	3·09	15	4·47	18	5·41	15	9·96	13	3·82	22	2·99	10	1·03	15	1·95	232	63·84
13	2·87	16	6·92	13	7·93	17	8·46	14	5·33	21	3·43	8	1·53	14	2·31	205	68·58
9	2·45	13	4·01	12	7·75	14	9·13	11	3·50	22	2·48	9	·85	13	1·38	207	57·06
10	2·29	16	9·30	17	11·65	15	9·08	10	3·58	19	4·78	6	2·74	13	4·14	201	86·30
10	2·31	17	8·45	11	7·88	15	9·10	12	3·48	20	4·89	11	2·33	16	2 87	201	73·43
11	4·65	16	4·36	14	7·59	15	8·37	13	3·22	21	3·72	12	1·44	11	1·43	226	60·84
8	2·75	16	8·70	14	8·02	13	9·88	16	3·70	12	2·15	12	1·60	9	1·90	189	70·69
11	5·49	16	11·99	13	9·43	11	12·91	7	3·36	16	4·78	8	2·11	8	1·31	197	88·47
14	2·36	19	8·50	21	11·89	16	9·09	12	5·74	19	2·67	12	1·53	13	2·29	242	67·03
15	3·71	15	7·80	16	8·80	13	13·25	16	5·39	28	5·27	15	1·90	13	3·01	246	84·14
9	2·93	15	13·89	17	9·23	16	12 01	9	4·48	18	4·78	12	2·48	11	2·25	199	88·20
13	2·86	17	9·69	19	11·41	13	11·17	7	4 95	16	2·95	1	·54	10	2·26	181	77·22
15	5·25	18	18·39	18	9·30	19	15·09	15	5·72	26	5·67	13	1·90	12	1.72	268	103·03
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	4·59	20	11·61	18	8·39	20	12·40	18	6·70	25	6·13	12	2·20	15	3·68	267	96·89
16	4·71	18	8·98	14	9·40	13	14 25	12	5·54	21	4·87	12	2·25	13	3·04	213	* 85·60
17	4·96	22	14·71	22	9 84	22	16·59	20	5·51	26	6·46	19	2·18	17	2 84	324	106·70
16	2·80	21	10·00	17	7·17	17	11·80	15	4·22	23	5·13	13	2·30	18	2·77	277	82·73
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* Rainfall for 15 months, that for December 1926 misisng.